

RECORD OF DECISION

Site 1 – Golf Course Landfill

Site 4 – Fire Fighting Training Unit

Naval Station Great Lakes, Illinois





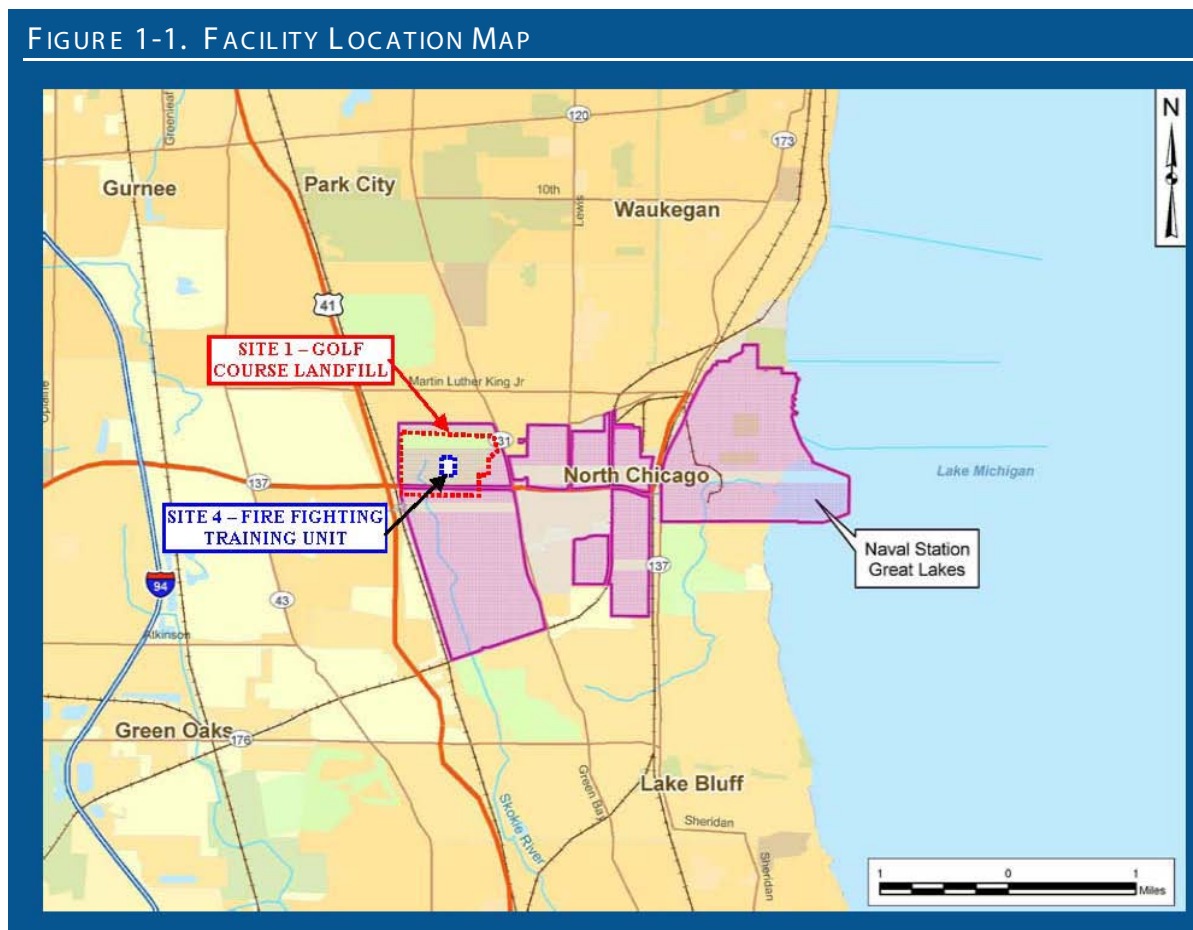
NAVAL STATION GREAT LAKES, ILLINOIS



1.0 Declaration

This Record of Decision (ROD) presents the Selected Remedy for Site 1 - Golf Course Landfill and Site 4 - Fire Fighting Training Unit (FFTU) located at Naval Station Great Lakes, Great Lakes, Illinois, United States Environmental Protection Agency (USEPA) Identification Number IL7170024577 (Figure 1-1). The Selected Remedy for addressing soil, sediment, groundwater, and surface water at the sites includes containment, land use controls (LUCs), and monitoring. This ROD documents the final remedial action for these two sites and does not include or affect any of the other sites at the facility. This decision is based on information contained in the Administrative Record file for the sites. Information not specifically summarized in this ROD or its references but contained in the Administrative Record has been considered and is relevant to the selection of the remedy. Thus, the ROD is based upon and relies upon the entire Administrative Record file for the sites in making the decision.

FIGURE 1-1. FACILITY LOCATION MAP



The Sites 1 and 4 remedial action was selected by the Navy, as the lead agency, in consultation with the Illinois Environmental Protection Agency (Illinois EPA), the support agency, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, Title 42 United States Code Sections (t) 9601 et seq., and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations 5300, et seq. Sites 1 and 4 are part of a comprehensive environmental investigation and cleanup program currently being performed at Naval Station Great Lakes under CERCLA authority. Naval Station Great Lakes is an active facility, and environmental investigations are funded under Environmental Restoration, Navy (ER,N).

Sites 1 and 4 were included in several environmental investigations including the base-wide **Initial Assessment Study** (IAS) in 1986. Several site-specific investigations were performed at Site 4 between 1991 and 2000 as the FFTU located there was being decommissioned. These investigations included:

- **Technical Memorandum on the Remedial Investigation (RI) Verification Step**, (Dames and Moore, 1991).
- **Remedial Investigation Report, FFTU**, (Beling, 1998).
- **Delivery Order Completion Report, Remedial Investigation of Soils, Former FFTU Sludge Pit**, (TolTest, 2000).

An **RI/Risk Assessment** (RA) Report was prepared for Site 1 in 2008. This report was followed by a **Focused Feasibility Study** (FFS) in 2009. Because of their proximity within the limits of the Willow Glen Golf Course and the similarity of their anticipated remedies, Sites 1 and 4 were combined for the RA portion of the RI/RA and for the FFS.

There have been no cited violations under federal or state environmental law or any past or pending enforcement actions pertaining to the cleanup of Sites 1 and 4.

The Selected Remedy eliminates unacceptable risk associated with potential future exposure to buried landfill wastes at Site 1 and associated constituents of concern (COCs) in subsurface soil (lead and dioxins/furans) and sediment (polynuclear aromatic hydrocarbons [PAHs]) at the site through the use of containment through maintenance and monitoring of the existing soil cover and the placement of a riprap layer over a localized area of sediment. The maintenance and monitoring of the soil cover is also identified as an appropriate remedy to eliminate unacceptable risk associated with potential future exposure to residual subsurface soil contamination (PAHs) at Site 4. Waste materials and residual contamination within the Sites 1 and 4 have led to elevated levels of metals in groundwater. The Selected Remedy eliminates unacceptable exposure to arsenic, iron, lead, manganese, and vanadium in groundwater at Site 1 and PAHs and VOCs at Site 4 through LUCs. Generation of impacted surface water will be mitigated through relocation and replacement of the damaged Skokie Ditch piping, therefore, unacceptable exposure to impacted surface water (PAHs and dioxins/furans) at Site 1 will be eliminated. This action will eliminate the current situation in which groundwater within the landfill leaks into the pipe and is discharged directly to surface water.

The remediation of the sites will not adversely impact the current and reasonably anticipated future land use of the sites, which is as a golf course.

1.1 SELECTED REMEDY

The response action selected in this ROD is necessary to protect the public health and welfare or the environment from actual or potential releases of hazardous substances into the environment. A CERCLA action is required because landfill wastes are to remain at the sites. Additionally, unacceptable human health risks were identified under future land use scenarios from exposure to COCs in media at the sites. The Selected Remedy utilizes elements of the **presumptive remedy** for CERCLA military landfills with municipal landfill waste because the Site 1 has characteristics of such landfills (Directive

No. 9355.0-67FS, <http://www.epa.gov/fedfac/documents/1296mem.htm>). Although Site 4 is not a landfill, impacted subsurface soil and groundwater there have similar characteristics to Site 1 and therefore similar remedies were deemed appropriate. The Selected Remedy for Sites 1 and 4 consists of the following elements:

Containment to be achieved by maintaining the existing golf course soil and vegetative cover, which provides an equivalent final cover component as defined by landfill regulations cited in 35 Illinois Administrative Code 807 that requires a minimum of 3 feet of low permeable soil cover on top of the impacted areas;

Re-routing of storm sewer lines to the landfill perimeter with the abandonment of lines that run through the landfill by grouting them closed;

Incorporation of LUCs into the Base Master Plan, which already restricts groundwater and surface water use, to also restrict disturbance of surface and subsurface soil and to prohibit residential development.

The Selected Remedy was chosen to meet Remedial Action Objectives (RAOs) based on evaluation of site conditions, site-related risks, anticipated future land use, and applicable or relevant and appropriate requirements (ARARs). The Selected Remedy is protective of human health and the environment, is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. The Selected Remedy is expected to achieve substantial long-term risk reduction and allow the property to be used for the current and reasonably anticipated future land use, which is as a golf course.

No source materials constituting principal threat wastes, as defined in USEPA (1991), are present at the sites, and based on use of the presumptive remedy, the lack of treatment was deemed appropriate. Because this remedy will result in landfill materials and impacted media remaining on site, LUCs will be instituted to ensure that RAOs are achieved by limiting site use to non-residential activities and by limiting excavation or disturbance of surface and subsurface soil without appropriate safety precautions. This remedy will result in hazardous substances remaining on site at levels that do not allow for unlimited use and unrestricted exposure; therefore, in accordance with Section 121(c) of CERCLA and NCP §300.430(f)(5)(iii)(c), a statutory review will be conducted within 5 years of initiation of remedial action, and every 5 years thereafter, to ensure that the remedy continues to be protective of human health and the environment.

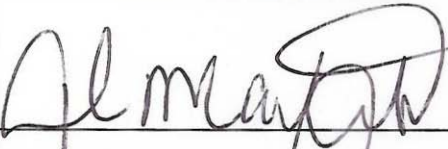
1.2 DATA CERTIFICATION CHECKLIST

The data included in this ROD are summarized in Table 1-1 below. Additional information can be found in the Administrative Record file for Naval Station Great Lakes.

TABLE 1-1. ROD DATA CERTIFICATION CHECKLIST	
DATA	LOCATION IN ROD
COCs and their respective concentrations	Sections 2.3 and 2.5
Baseline risk represented by the COCs	Section 2.5
Cleanup levels established for COCs and the basis for these levels	Section 2.7
How source materials constituting principal threats are addressed	Section 2.6
Current and reasonably anticipated future land use assumptions used in the risk assessment	Section 2.4
Potential land and groundwater uses that will be available at the sites as a result of the Selected Remedy	Section 2.9.3
Estimated capital, operating and maintenance (O&M), and net present worth (NPW) costs; discount rate; and number of years over which the remedy costs are projected	Section 2.8.1
Key factors that led to the selection of the remedy	Section 2.9.1

If contamination posing an unacceptable risk to human health or the environment is discovered after execution of this ROD, the Navy will undertake the necessary actions to ensure continued protection of human health and the environment.

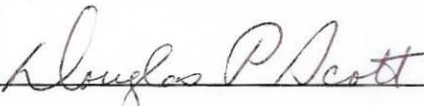
1.3 AUTHORIZING SIGNATURES



John Malfitano, Captain, United States Navy
Commanding Officer, Naval Station Great Lakes

11e NOV 2010

Date



Douglas P. Scott, Director, Illinois EPA

January 6, 2011

Date

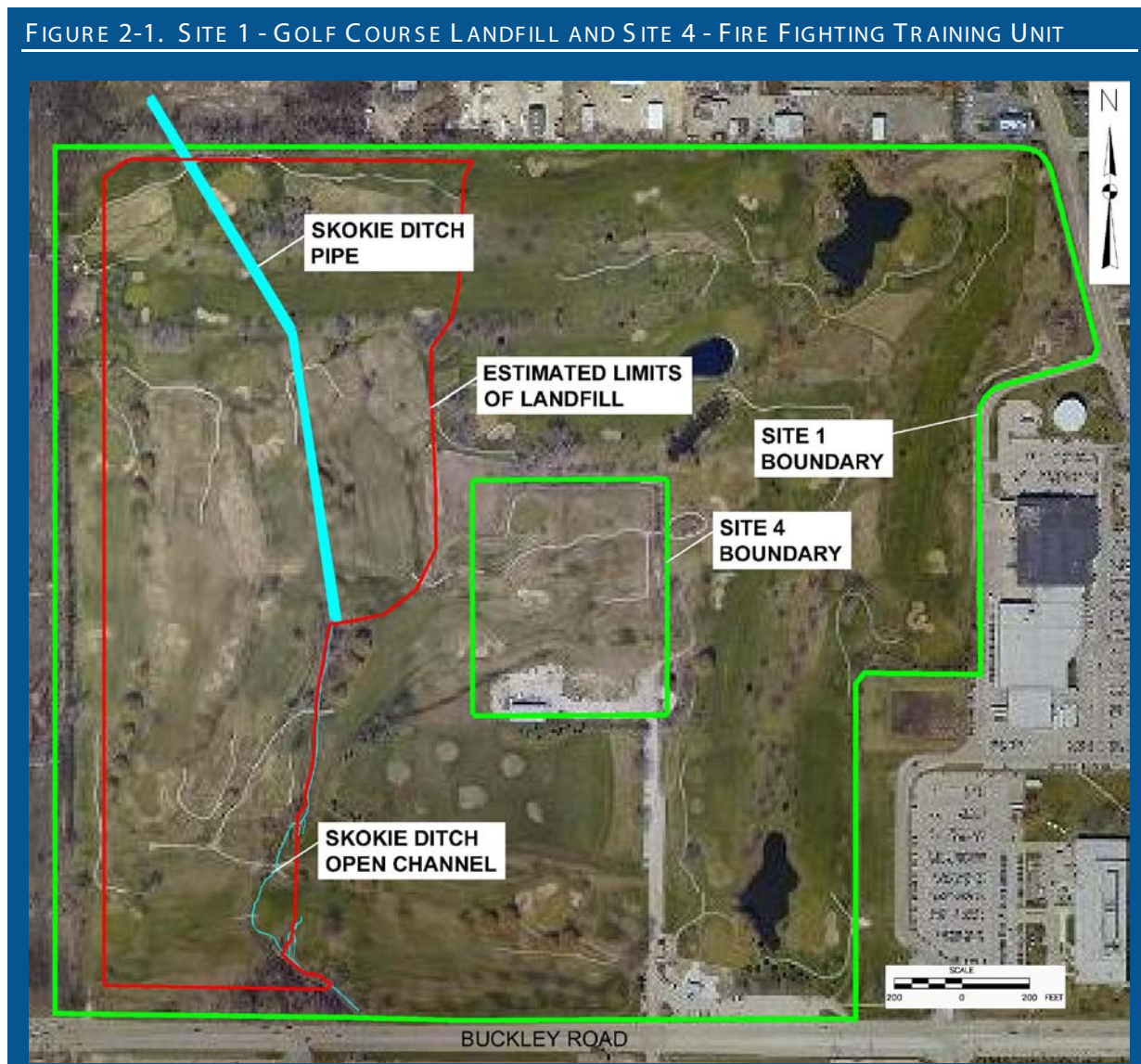
2.0 Decision Summary

2.1 SITE DESCRIPTION AND HISTORY

Naval Station Great Lakes is located in Lake County, Great Lakes, Illinois, along the shore of Lake Michigan. The majority of Naval Station Great Lakes activities occur on a plateau atop a steep bluff that rises 70 feet above the beach along Lake Michigan. The facilities at Naval Station Great Lakes are used to support naval training and consist of the Recruit Training Command, Training Support Center, and Naval Facilities Engineering Command Midwest.

Sites 1 and 4, the Golf Course Landfill and FFTU, respectively, are located entirely within the limits of the 18-hole Willow Glen Golf Course. The golf course is owned and operated by the Navy and covers approximately 125 acres in the northwestern portion of the facility. The course is used by Naval Station Great Lakes personnel and people from the surrounding area and is located north of Buckley Road and east of Route 41 (see Figure 2-1). The Golf Course Landfill was operated on approximately 50 acres that are now covered by the western (back nine) part of the golf course, and the FFTU was located on approximately 10 acres that are near the center of the course.

FIGURE 2-1. SITE 1 - GOLF COURSE LANDFILL AND SITE 4 - FIRE FIGHTING TRAINING UNIT



The **Golf Course Landfill** operated between 1942 and 1967 as a trench/burn facility. It received an estimated total of 1.5 million tons of material during its years of operation. The material was mostly domestic refuse but also included sewage sludge, petroleum, oil and lubricants, solvents, coal ash, and materials contaminated by polychlorinated biphenyls (PCBs) (Guernsey, 2002). A dragline was used for excavation of the trenches, which were approximately 8 feet wide and dug to at least the top of the water table [reportedly 6 to 8 feet below ground surface (bgs) in this area]. Occasionally, the trenches had several feet of standing water in the bottom. General refuse and trash were disposed directly into these trenches. Free liquid oil, such as waste engine oil from activity shops, was also disposed in this manner. After a significant volume of material was placed in a trench, the material was ignited and allowed to burn. Proceeding in this manner, the trenches were progressively filled and covered with soil from west to east and north to south (Rogers, Golden and Halpern, 1986). When the landfill was closed in 1967, a layer of ash from coal-fired power plants at Naval Station Great Lakes was placed over the landfill, and soil was placed over the ash.

Based on aerial photography, it appears that the front nine-hole portion of the golf course was constructed between 1953 and 1955. A clubhouse for the golf course, Building 3312, and associated parking lot were originally constructed in 1963. The original building was demolished in 2007 and replaced in the spring of 2008, at a site approximately 150 feet due north, by the current clubhouse. The back nine-hole portion of the golf course was initially constructed over the landfill in 1968 and was reconfigured through the placement of additional soil fill in 2003 (Guernsey, 2002).

In 2003, **sinkholes** occurred within the limits of Site 1 that were attributed to the collapse of an underground storm sewer pipe that conveys the Skokie Ditch under a portion of the Site 1 landfill. When sinkhole and pipe repair work was performed in October 2003, it was determined that the existing storm sewer, which is estimated to be over 50 years old, was in a deteriorated condition. Although design documents for the storm sewer were not available, it was determined during repair work that the failed portion of the system is composed of clay pipe installed without gravel/stone bedding. Additional collapses may cause up gradient stormwater to saturate the landfill mass or allow waste materials from the landfill or groundwater to enter the pipe and be discharged to the Skokie Ditch.

Site 4 was the site of the FFTU, which was used from 1942 to 1989 to train naval recruits in the fundamentals of fire fighting. Fuels in open burn pits, concrete carrier compartments, and gasoline burning compartments were ignited there to simulate fires. Fuels were delivered to the burn areas through pressurized underground pipes. **Unburned fuels** and wastewater were drained from the burn areas and treated using separators and decant ponds on the western side of the FFTU. Treated wastewater was commingled with stormwater and discharged into a storm sewer that discharges into Skokie Creek, approximately 0.25 mile west and south of the site (Beling, July 1998). Over the years, the soil and groundwater beneath the FFTU site were contaminated with fuel oil, gasoline, and undetermined accelerants/fuels. The contamination at the FFTU has been directly or indirectly attributed to the former pressurized piping system, former underground storage tanks, sludge pits, and fire fighting exercises. In 1997, the piping and subsurface vaults, tanks, pits, sludge pits, soil, and other features were successfully removed, sorted, and characterized for appropriate disposal and/or treated on site. **Biopiles** were constructed on site in accordance with a pre-approved remediation design to treat petroleum-contaminated soil using ex-situ bioremediation techniques. The biopile remediation was completed in 1998. As identified in subsequent investigations some residual soil contamination remained at the site following cleanup activities.

2.2 PREVIOUS INVESTIGATIONS

Table 2-1 provides brief summaries of previous investigations performed at Sites 1 and 4. The nature and extent of the buried landfill wastes at Site 1 and chemicals of potential concern (COPCs) in the various media at both sites are discussed in Section 2.3. Data collected as part of the Site 1 2008 RI and the Site 4 1998 RI were both used to assess human health risks under various current and future end-use scenarios.

TABLE 2-1. PREVIOUS INVESTIGATIONS AND SITE DOCUMENTATION

INVESTIGATION	DATE	ACTIVITIES
Initial Assessment Study	1986	Included review of historical records and aerial photographs, field inspections, and personnel interviews to evaluate the potential for environmental impacts at numerous sites across the base. Sites 1 and 4 were identified as areas where further investigation was recommended to confirm or refute the presence of suspected contamination.
Technical Memorandum on the Remedial Investigation Verification Step	1991	Included the collection of groundwater and surface water samples at Sites 1 and groundwater, surface water, and soil samples at Site 4. Results indicated the presence of inorganic in shallow groundwater at Site 1 at levels exceeding Illinois General Use Water Quality Standards Maximum Contaminant Levels. Results from Skokie Ditch surface water within Site 1 indicated the presence of inorganics and oil and grease at levels exceeding Illinois EPA surface water quality criteria. Site 4 soil samples had elevated concentrations of petroleum hydrocarbons, and oil and grease were detected in shallow groundwater .
Technical Memorandum - Site Sampling in Support of Relative Risk Evaluation	1998	Included four shallow soil samples from Site 1 analyzed for Target Analyte List (TAL) metals, cyanide, and Target Compound List (TCL) volatiles, semivolatiles, pesticides, and PCBs. Results indicated PAHs and inorganics in soil at levels exceeding Illinois EPA Tiered Approach to Corrective Action Objectives (TACO) residential and commercial/industrial remediation objectives and exceedances of USEPA Region 9 preliminary remediation goals (PRGs). This effort was used generating a contaminant hazard score and a resulting relative risk ranking of multiple Naval facilities.
Remedial Investigation, FFTU	1998	Included collection of subsurface soil, groundwater, surface water, and sediment samples at Site 4 following removal of underground piping, contaminated soil, and an underground storage tank. A total of 205 subsurface soil samples were collected from 164 locations and field screened. Twenty-four additional samples were selected from 41 direct push borings and submitted for laboratory analysis. A total of 53 groundwater samples were collected from 44 locations and subjected to testing. Twenty-seven of those were submitted for laboratory analysis. Additionally, four co-located surface water and sediment samples were collected and submitted for analysis. Laboratory Results indicated PAHs and VOCs were present in 2 of 24 soil samples and in 2 of 27 groundwater samples at levels exceeding Illinois EPA Tier 1 TACO residential groundwater remediation objectives. A TACO Tier 2 analysis , which includes modeling to predict the concentrations of the COPCs at the point of compliance, predicted that contamination would not migrate off site at concentrations exceeding Tier 1 PRGs.
Remedial Investigation of Soils, Former FFTU Sludge Pit	2000	Included collection of soil samples from nine borings at Site 4 to evaluate the presence of COPCs within the 0.40-acre limits of a former sludge pit located there. Results indicated inorganics in soil at levels exceeding TACO Tier 1 remediation objectives for residential properties but were less than Tier 2 objectives.
Remedial Investigation/Risk Assessment, Site 1 – Golf Course Landfill	2008	Included subsurface soil sampling, installation and sampling of temporary and permanent monitoring wells, aquifer testing of permanent monitoring wells, and surface water and sediment sampling across Site 1 only. Samples were collected from 16 of the 103 soil borings , 14 wells, five surface water locations, and seven sediment locations. The borings were to visually delineate the extent of the buried landfill materials. COPCs were detected at concentrations that exceeded human health screening criteria in subsurface soil, groundwater, surface water, and sediment. An RA was performed using data from the Site 1 RI. This RA also incorporated data from the Site 4 RI. The results are discussed in Section 2.5 below.
Focused Feasibility Study	2009	Evaluated alternatives including the use of containment, monitoring, and LUCs for Sites 1 and 4 to eliminate unacceptable risks associated with leaving waste and contaminated media in place.

2.3 SITE CHARACTERISTICS

Physical Characteristics

Sites 1 and 4 are located entirely within the limits of the 125-acre Willow Glen Golf Course. The most prominent topographic feature on the course property is the Skokie Ditch, which runs north to south across the western half of the property. The northern third of the ditch is conveyed in pipes buried beneath the course, and the southern portion of the ditch is contained within an open channel (Figure 2-2). The course is contoured with mounds, tee boxes, bunkers, and greens; however, the terrain is generally moderate in slope and directed toward the open channel portion of the Skokie Ditch at an overall grade of about 1.5 percent (Figure 2-3). Three small irrigation ponds, which range in size from 0.4 to 1.4 acres in size, are present in the northeastern quadrant of the course, and another 0.7-acre pond is located in the southeastern corner outside the estimated limits of the Site 1 landfill. Most surface water runoff from the golf course, including Sites 1 and 4, flows over land toward and into the Skokie Ditch channel.

FIGURE 2-2. SOUTHERN END OF SKOKIE DITCH



The Golf Course Landfill extends over the piped portion of the Skokie Ditch to the north and abuts the western side of the open channel portion of the ditch along its southern extent. Site 1 is bounded by the course property boundaries at both its northern and western extents. Site 4 is approximately 10 acres in size, rectangular in shape, and located east of the Skokie Ditch near the center of the golf course property. Both Sites 1 and 4 are covered entirely by elements of the golf course. Other than the sand bunkers, irrigation ponds, and Skokie Ditch area, the entire course, including Sites 1 and 4, is covered with grass that is frequently maintained.

FIGURE 2-3. TYPICAL SITE CONDITIONS

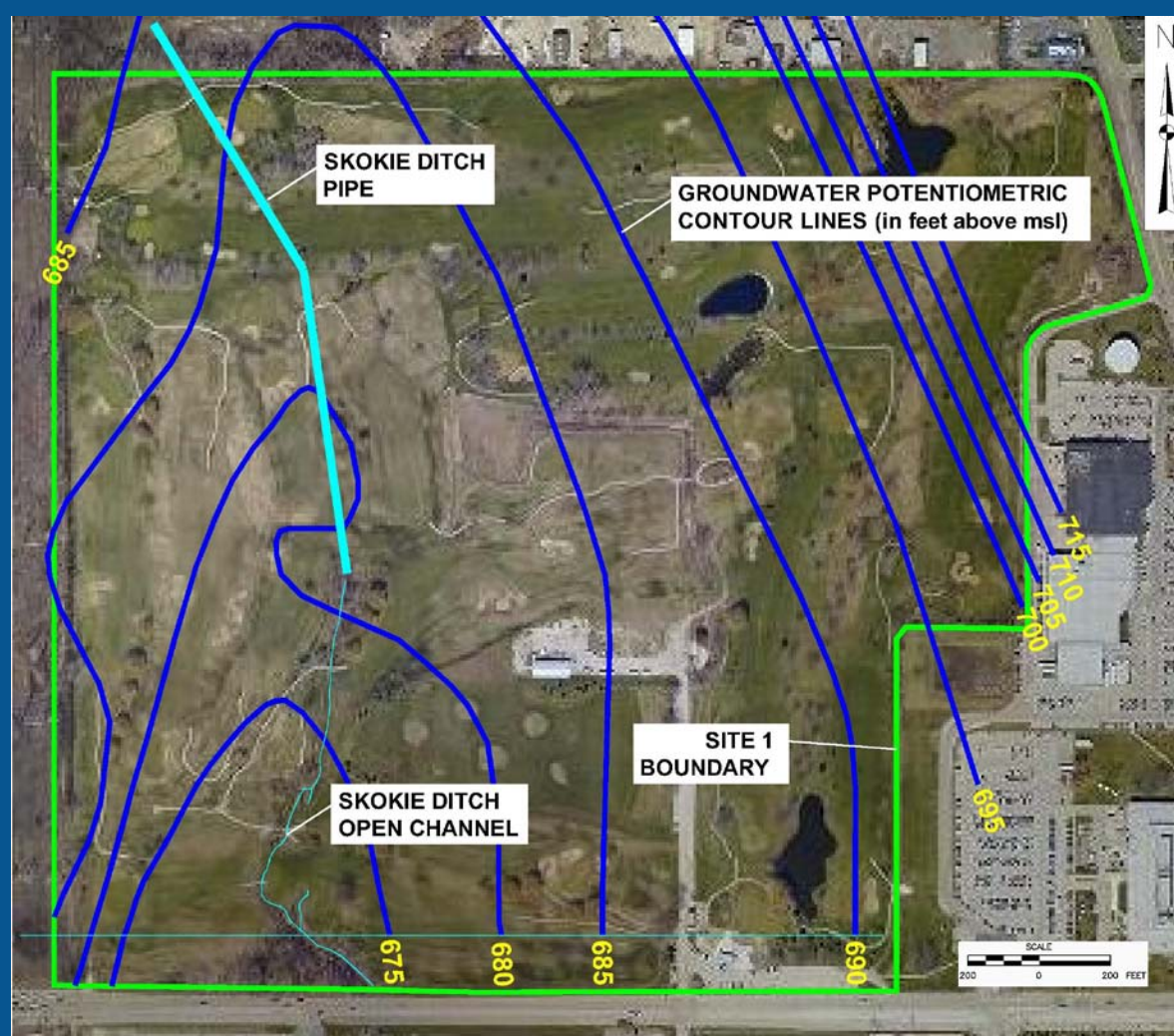


The natural overburden at both Sites 1 and 4 consists predominantly of **clayey soil** with infrequent silty sand and gravel layers to a depth of 40 feet bgs. In the western portion of Site 1, a thin shallow layer of **ash material** was observed beneath the topsoil layer. Ash from on-base coal-burning power plants was used as cover material during closure of the landfill and as fill in many areas of the golf course. This material is composed predominately of black sands and cinders. The thickness of the ash layer varied significantly where it was encountered but was generally less than

0.5 foot thick. Landfill material observed in borings within the limits of Site 1 was composed of black sands intermixed with significant metal, plastic, glass, and wood. No cinder-like material was observed in the landfill material. Where landfill materials were encountered in borings performed as part of the RI, they were found to be covered with a minimum of 2 feet and on average 6.5 feet of soil. Aside from the thin layers of ash material, cover materials consisted predominately of brown silty clay.

Shallow groundwater is the only groundwater determined to be of concern at the sites due to the presence of regional aquitards formed by the glacial till which limit downward migration of contaminants into deeper aquifers used for drinking water. Shallow groundwater was typically encountered from 1 to 17 feet bgs and is located within the clayey overburden with discontinuous sand and gravel lenses that are interspersed throughout Sites 1 and 4. Potentiometric contours developed from water elevations in monitoring wells suggest that the **shallow groundwater** gradient at Sites 1 and 4 converges toward the open channel portion of the Skokie Ditch in the southern portion of the site (Figure 2-4); however, significant groundwater flow potential is likely limited to sand and gravel lenses, which were not observed to be laterally extensive. At many soil-boring locations, including locations reaching 40 feet bgs, no water was encountered even when sand and gravel lenses were encountered. Additionally, many soil borings did not contain sand and gravel lenses and were dry. Therefore, shallow groundwater is expected to have only limited lateral migration through the more permeable materials encountered in the overburden and is likely to be discontinuous across the site.

FIGURE 2-4. SITE GROUNDWATER



Nature and Extent of Contamination

The primary source of Site 1 contamination is assumed to be the former landfill wastes. It is estimated that 1.5 million tons of varying **waste materials** were brought to the Golf Course Landfill over its period of operation. Due to reduction of the waste through burning, it is estimated that 500,000 tons remain. Types of waste reportedly disposed at the landfill include domestic refuse, sewage sludge, petroleum, oil and lubricants, solvents, coal ash, and materials contaminated by PCBs. Surface water and sediment within the Skokie Ditch contained slightly elevated levels of metals and PAHs; however, background data was not collected to determine whether concentrations differ significantly from what would be found upgradient of the landfill. Because storm sewer pipes run through the center of the landfill, it is assumed that at least some of the surface water and sediment contamination is due to infiltration of landfill contaminants into the pipes, which are known to be damaged. It is suspected that leachate and possibly waste has entered the pipes and has discharged into the ditch. Although currently the contaminants in surface water and sediment are relatively low, there remains a potential for a future increase in contamination, either through the slow but continual degradation of the storm sewer pipes or through a large catastrophic break.

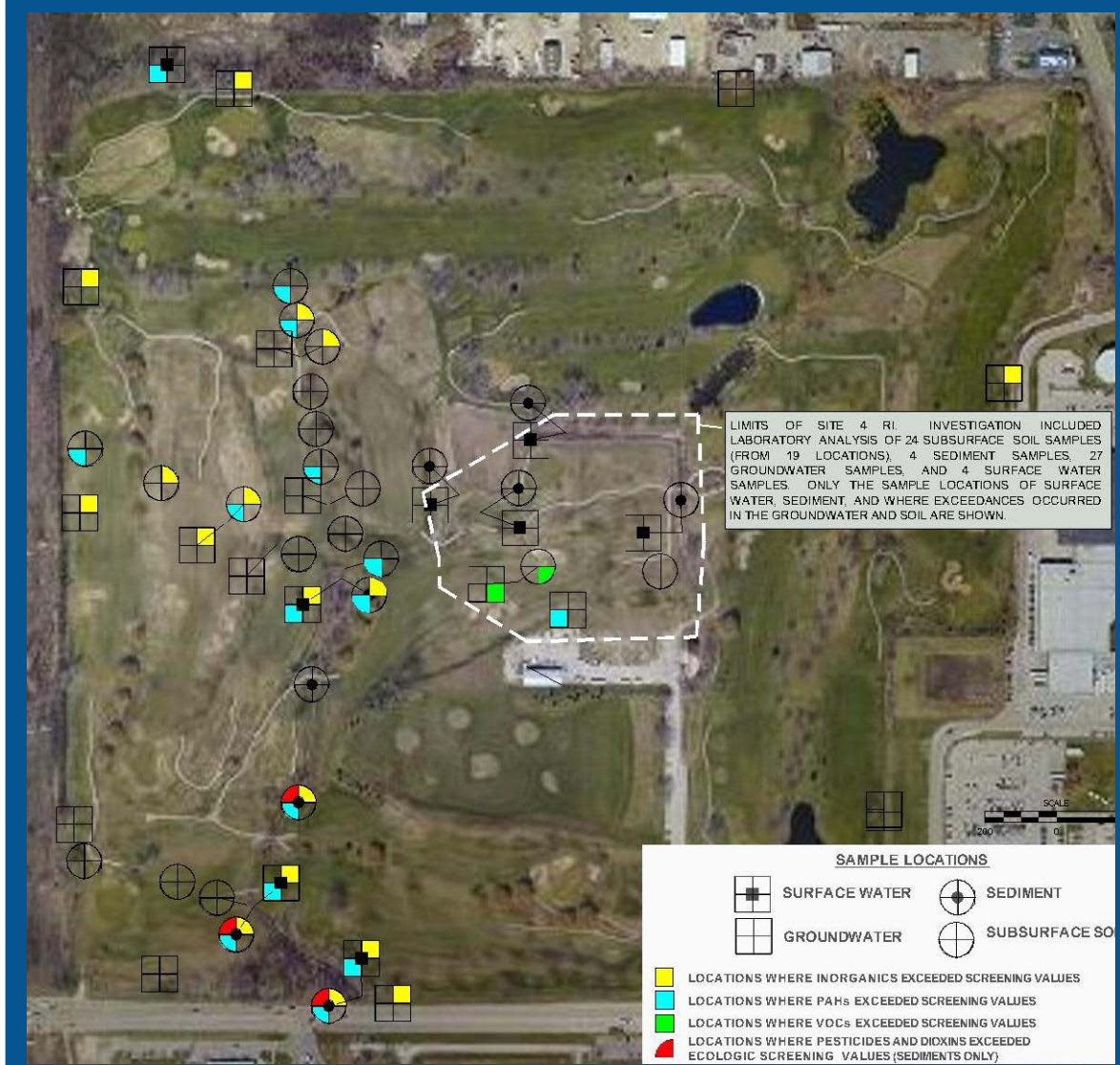
The primary source of Site 4 contamination appears to be from petroleum products (diesel fuel and gasoline) stored at the site and used in fire fighting training exercises. Remnants of these materials remain in localized areas in subsurface soil and groundwater at low levels following past FFTU cleanup activities. Through the development of the property as a golf course, the wastes and impacted materials at both sites have been covered with a layer of clean soil with thicknesses of 3 feet or more.

The following summarizes the nature and extent of **contamination in the site media** as encountered during the investigations at each of the sites:

- Volatile organic compounds (VOCs) were detected in subsurface soil, groundwater, and surface water at Site 1 at concentrations less than applicable human health and ecological screening criteria. Volatile organic compounds were detected in subsurface soil and groundwater at Site 4. Only one sample from each of those media had concentrations that exceeded applicable human health screening criteria. No VOCs were detected in sediment samples from either site.
- PAHs were detected in subsurface soil and groundwater at concentrations exceeding human health and/or ecological screening criteria at both sites. PAHs were detected in sediment and surface water at concentrations exceeding human health and/or ecological screening criteria at Site 1 only.
- Pesticides were detected in subsurface soil and sediment samples at Site 1 only, with some results exceeding screening criteria for ecological receptors only. The presence of low-level pesticides in soil and sediment samples is likely a result of routine historical use at the golf course, rather than an indication of pesticide disposal at the landfill.
- Dioxin/furans were detected in subsurface soil and sediment samples at Site 1, with some subsurface soil sample results exceeding human health screening criteria and some sediment sample results exceeding screening criteria for ecological receptors. Samples from Site 4 were not analyzed for dioxin/furans. Low-level dioxin/furans are likely present due to the past burning activities at the property.
- Low concentrations of PCBs, less than human health and ecological screening criteria, were detected in several subsurface soil samples and one sediment sample at Site 1 only.
- Herbicides were detected in one subsurface soil sample at Site 1, at a concentration less than the human health and ecological screening criteria. The presence of low-level herbicides in soil and sediment samples is likely a result of routine historical use at the golf course, rather than an indication of herbicide disposal at the landfill.
- Several metals were detected in subsurface soil, groundwater, sediment, and surface water samples at concentrations greater than human health and/or ecological screening criteria at Site 1. The detected metals include aluminum, arsenic, barium, chromium, iron, lead, silver, manganese, thallium, and vanadium. Samples from Site 4 were not analyzed for metals.

Figure 2-5 shows all the Site 1 RI sampling locations and identifies locations where inorganic, PAH, pesticide and dioxin/furan concentrations exceeded Illinois TACO criteria and/or USEPA Region 9 residential or ecological PRGs. Site 4 RI data are also presented on the figure. Due to the extensive amount of sampling performed at Site 4, only subsurface soil and groundwater sampling locations where laboratory concentrations exceeded the screening values are shown.

FIGURE 2-5. SAMPLING LOCATIONS AND RESULTS



As determined from investigations at Site 4, the groundwater and residual subsurface soil contamination following remediation activities there meets Tier 2 cleanup objectives under Illinois laws and regulations (Illinois EPA, 1998). The **Site 4 RI recommended** containment through the use of the existing soil cover and LUCs. Based on the low levels of contamination and because Site 4 is located within the Site 1 boundary, the Navy and Illinois EPA decided to include Site 4 with Site 1 for remedial decision making.

2.4 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

Naval Station Great Lakes is an active Navy facility and is expected to remain active for the foreseeable future. The use of the Sites 1 and 4 areas as a golf course is also not expected to change. Properties

immediately adjacent to the site boundaries are generally commercial, industrial, or open space. Although they are not adjacent to the sites, there are residential areas located within an eighth of a mile of the north, east, and southern site boundaries. Future use of surrounding land is unknown but is anticipated to remain the same.

In accordance with Naval Station Great Lakes Instruction 11130.1 dated September 29, 2003, use of groundwater and surface water runoff within all geographical areas of the base, for any purpose, is strictly prohibited without prior written approval. Groundwater underlying Naval Station Great Lakes is **not used for drinking water**, and is not expected to be used as a water supply in the future. Drinking water for the base and residents of the surrounding communities is supplied from municipal systems drawing water from Lake Michigan. Additionally, the shallow aquifer below Sites 1 and 4 would serve as a poor water supply because the shallow groundwater is not sufficiently productive to provide a consistent long-term source of water. If future land use at the sites differs from the reasonable anticipated land use, the Navy will reassess risks appropriate to the future use.

2.5 SUMMARY OF SITE RISKS

The baseline risk assessment estimates what risks the site poses if no action was taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. A human health risk assessment (HHRA) and an ecological risk screening evaluation were conducted for Sites 1 and 4 as part of the RA (TtNUS, 2008). Results of these assessments are provided in the following sections.

2.5.1 Summary of Human Health Risk

A quantitative HHRA was performed for the sites to characterize the potential risks to likely human receptors under current and potential future land uses. The HHRA was conducted using chemical concentrations detected in subsurface soil, groundwater, surface water, and sediment samples. Key steps in the risk assessment process included identification of **COPCs**, exposure assessment, toxicity assessment, and risk characterization. Chemicals that contributed to unacceptable risk through this process were identified as COCs. Surface soil (up to 3 in depth) was not included in the sampling program or the HHRA because surface soil consists of soil material and ash that was placed over the area during landfill closure activities and subsequent construction and reconstruction of the golf course.

COPCs were identified by comparing maximum chemical concentrations in various media to their respective regulatory established screening values. In all cases, if the maximum concentration of a constituent exceeded any of these criteria and if the constituent was present at concentrations greater than in background soil, the chemical was selected as a COPC and carried through to the quantitative risk assessment for the respective medium.

Screening values for subsurface soil and sediment in Skokie Ditch included the following:

- Illinois EPA Tier 1 Soil Remediation Objectives (TACO) for Residential Properties (2007). These include remediation objectives for the soil ingestion exposure route and inhalation exposure route. The lowest Tier I objective for the receptors listed in the Tier 1 Tables (i.e., residential, industrial/commercial, or construction worker) was used for screening.
- USEPA Region 9 PRGs for Residential Soil (2004).
- USEPA Generic Soil Screening Levels (SSLs) for the inhalation of volatiles and fugitive dusts based on methodology from USEPA's Soil Screening Guidance (1996).
- Illinois EPA Tier 1 Soil Remediation Objectives for Residential Properties for the Soil Component of the Groundwater Ingestion Exposure Route for Class I Groundwater (2007).
- USEPA generic SSLs for migration from soil to groundwater based on methodology from USEPA's Soil Screening Guidance (1996 and 2002).

Screening values for groundwater and surface water in Skokie Ditch included the following:

- Illinois EPA Tier 1 Groundwater Remediation Objectives for Class 1 Groundwater (2007).
- USEPA Region 9 PRGs for Tap Water (2004).
- USEPA Maximum Contaminant Levels (MCLs) (2006)
- USEPA Groundwater screening levels for evaluating the vapor intrusion to indoor air (2002)

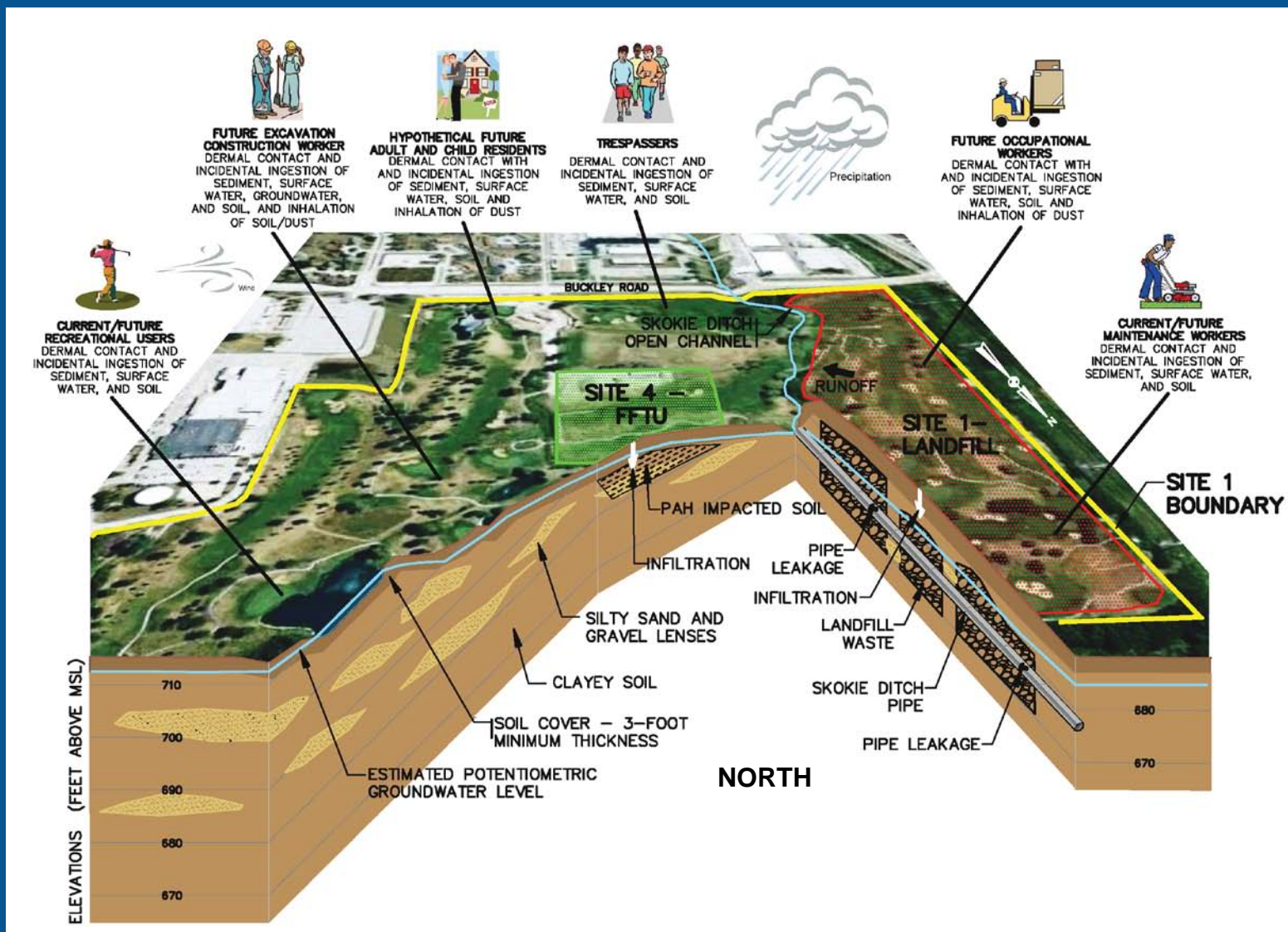
The **exposure assessment** evaluated current and potential future exposure pathways through which humans might come into contact with the COPCs (as identified in the previous step). The results of the exposure assessment were used to refine the conceptual site model (CSM) (Figure 2-6), which identifies potential contaminant sources, contaminant release mechanisms, transport routes, and receptors under current and future land use scenarios. Potential exposure routes for subsurface soil, sediment, groundwater, and surface water include incidental ingestion (swallowing small amounts), dermal contact (skin exposure), and/or inhalation (breathing) of airborne particulates. Potential receptors under current land use are maintenance workers, adolescent trespassers, and adult recreational users. Potential receptors under future land use are construction/excavation workers, occupational workers, and hypothetical child and adult residents. Although the sites are not likely to be developed for residential use, potential future residential receptors were evaluated in the HHRA primarily for decision-making purposes. Current and hypothetical future exposure pathways at sites 1 and 4 are summarized in Table 2-2.

TABLE 2-2. EXPOSURE PATHWAYS						
RECEPTOR	PATHWAY	EXPOSURE MEDIUM				
		SEDIMENT	SURFACE WATER	GROUNDWATER	AIRBORNE DUST AND VAPORS	SUBSURFACE SOIL
Construction/Excavation Workers (future land use)	Dermal Contact	○	○	○		○
	Ingestion	○	○			○
	Inhalation				○	
Maintenance Workers (current and future land use)	Dermal Contact	■	■			○
	Ingestion	■	■			○
	Inhalation					
Occupational Workers (future land use)	Dermal Contact	○	○			○
	Ingestion	○	○			○
	Inhalation				○	
Recreational Users (current and future land use)	Dermal Contact	■	■			○
	Ingestion	■	■			○
	Inhalation					
Trespassers (current and future land use)	Dermal Contact	■	■			○
	Ingestion	■	■			○
	Inhalation					
Adult and Child Residents (future land use)	Dermal Contact	○	○	○		○
	Ingestion	○	○	○		○
	Inhalation				○	

■ = Complete exposure pathway

○ = Potentially complete exposure pathway

FIGURE 2-6. CONCEPTUAL SITE MODEL



Potential cancer and non-cancer risks were calculated based on reasonable maximum exposure (RME) and central tendency exposure (CTE) assumptions under various land uses. The RME scenario assumes the maximum level of human exposure that could reasonably be expected to occur, and the CTE scenario assumes average or median level of human exposure. The Illinois EPA goal for carcinogenic risks, as specified in TACO, is 1×10^{-6} , and USEPA's generally acceptable cancer risk range is 1×10^{-4} to 1×10^{-6} . The Illinois and USEPA non-cancer risk threshold is a hazard quotient (HQ) of 1 for individual COCs. A Hazard Index (HI) is generated by adding the HQs for COCs that affect the same target organ (e.g., liver) or are associated with the same exposure pathway. An HI greater than 1 indicates that site-related exposures may present a risk to human health. **Quantitative estimates of non-cancer and cancer risks** were developed for each receptor for exposure to COPCs in each impacted medium under both RME and CTE scenarios (Table 2-3).

In **summary**, carcinogenic risks [incremental lifetime cancer risks (ILCRs)] for exposure to subsurface soil, groundwater, surface water, and sediment under current and future use scenarios were within USEPA's target risk range (1×10^{-6} to 1×10^{-4}), but exceeded the Illinois EPA goal of 1×10^{-6} for most receptors contacting these media. Non-carcinogenic risks for exposure to groundwater exceeded a HI of 1 for non-cancer effects, and therefore are considered unacceptable for future children and adult residents. Non-carcinogenic risks are very conservative and were based on the assumed exposure to maximum detected concentrations of iron, manganese, and vanadium in unfiltered groundwater samples.

TABLE 2-3. SUMMARY OF ESTIMATED POTENTIAL UNACCEPTABLE HUMAN HEALTH RISKS

RECEPTOR	MEDIUM	PATHWAY	COC	CANCER TOXICITY FACTOR (CSF) MG/KG-DAY	NON-CANCER TOXICITY FACTOR (RfD) MG/KG-DAY	EXPOSURE POINT CONCENTRATION (EPC)	RME		CTE	
							CANCER RISK	NON-CANCER HI	CANCER RISK	NON-CANCER HI
Construction/Excavation Workers	Subsurface Soil	Ingestion	Dioxins/Furans	1.5 x 10 ⁵	NA	9.0 x 10 ⁻⁰ ug/kg	4.0 x 10 ⁻⁶	2.0	2.0 x 10 ⁻⁶	1.0
	Total Risk (for all Media, all Pathways, and all COCs)						6.0 x 10 ⁻⁶	4.0	3.0 x 10 ⁻⁶	2.0
Maintenance Workers	Surface Water	Dermal	PAHs	7.3	NA	2.0 x 10 ⁻¹ ug/l	9.1 x 10 ⁻⁶	--	1.2 x 10 ⁻⁶	--
			Dioxins/Furans	1.5 x 10 ⁵	NA	4.0 x 10 ⁻⁶ ug/l	3.4 x 10 ⁻⁶	--	--	--
	Total Risk (for all Media, all Pathways, and all COCs)						2.0 x 10 ⁻⁵	--	2.0 x 10 ⁻⁶	--
Recreational Users	Surface Water	Dermal	PAHs	7.3	NA	2.0 x 10 ⁻¹ ug/l	1.1 x 10 ⁻⁵	--	2.0 x 10 ⁻⁶	--
			Dioxins/Furans	1.5 x 10 ⁵	NA	4.0 x 10 ⁻⁶ ug/l	4.6 x 10 ⁻⁶	--	--	--
	Total Risk (for all Media, all Pathways, and all COCs)						2.0 x 10 ⁻⁵	--	2.0 x 10 ⁻⁶	--
Adolescent Trespassers	Sediment	Ingestion	PAHs	7.3	NA	3.0 x 10 ³ ug/kg	2.0 x 10 ⁻⁶	--	--	--
	Surface Water	Dermal	PAHs	7.3	NA	2.0 x 10 ⁻¹ ug/l	1.7 x 10 ⁻⁵	--	5.7 x 10 ⁻⁶	--
			Dioxins/Furans	1.5 x 10 ⁵	NA	4.0 x 10 ⁻⁶ ug/l	6.4 x 10 ⁻⁶	--	2.1 x 10 ⁻⁶	--
	Total Risk (for all Media, all Pathways, and all COCs)						3.0 x 10 ⁻⁵	--	9.0 x 10 ⁻⁶	--
Future Child Residents	Sediment	Ingestion	PAHs	7.3	NA	3.0 x 10 ⁻³ ug/kg	4.0 x 10 ⁻⁶	--	--	--
	Surface Water	Dermal	PAHs	7.3	NA	2.0 x 10 ⁻¹ ug/l	1.0 x 10 ⁻⁵	--	1.2 x 10 ⁻⁶	--
			Dioxins/Furans	1.5 x 10 ⁵	NA	4.0 x 10 ⁻⁶ ug/l	3.8 x 10 ⁻⁶	--	--	--
	Groundwater	Ingestion	Arsenic	1.5	3.0 x 10 ⁻⁴	3.3 ug/l	4.0 x 10 ⁻⁵	--	4.0 x 10 ⁻⁶	--
			Iron	NA	70 x 10 ⁻¹	1.7 x 10 ⁴ ug/l	--	2.4	--	--
			Manganese	NA	2.0 x 10 ⁻²	5.1 x 10 ³ ug/l	--	2.4 x10 ¹	--	7.2
			Vanadium	NA	1.0 x 10 ⁻³	2.1 x 10 ¹ ug/l	--	2.0	--	--
	Total Risk (for all Media, all Pathways, and all COCs)						6.0 x 10 ⁻⁵	33.0	6.0 x 10 ⁻⁶	10.0
Future Adult Residents	Surface Water	Dermal	PAHs	7.3	NA	2.0 x 10 ⁻¹ ug/l	1.5 x 10 ⁻⁵	--	1.0 x 10 ⁻⁶	--
			Dioxins/Furans	1.5 x 10 ⁵	NA	4.0 x 10 ⁻⁶ ug/l	5.7 x 10 ⁻⁶	--	--	--
	Groundwater	Ingestion	Arsenic	1.5	3.0 x 10 ⁻⁴	3.3 ug/l	4.7 x 10 ⁻⁵	1.0	6.0 x 10 ⁻⁶	--
			Manganese	NA	2.0 x 10 ⁻²	5.1 x 10 ³ ug/l	--	6.9	--	3.3
	Total Risk (for all Media, all Pathways, and all COCs)						7.0 x 10 ⁻⁵	10.0	9.0 x 10 ⁻⁶	5.0

Dioxins/Furans - 2,3,7,8-TCDD TEQ

PAHs - BaP equivalents

-- Indicates acceptable risks by federal and state regulatory standards, i.e., cancer risk less than 1×10^{-6} or HI less than 1.0.

NA - Not applicable

EPCs from Table 6-9 in Site 1 RI/RA (2008)

2.5.2 Summary of Ecological Risk

A **Screening-Level Ecological Risk Assessment** (SERA) was performed as part of the RI/RA for Sites 1 and 4 to determine whether adverse ecological impacts are possible as a result of exposure to chemicals in site media.

Surface soil samples were not collected because waste at the sites is covered by a thick layer of soil or by soil underlain by ash. Because of this layer, there is not a complete pathway for terrestrial receptors to be exposed to subsurface soil; therefore, risks to terrestrial ecological receptors from soil were not evaluated in the SERA. Potential ecological receptors (i.e., benthic macroinvertebrates and fish) can be exposed to chemicals in the surface water and sediment of Skokie Ditch by direct contact with and incidental ingestion of surface water and surface sediment (from 0 to 4 centimeters bgs). Also, mammals and birds can be exposed to chemicals in the surface water and surface sediment of Skokie Ditch by direct contact, ingestion of contaminated food items, and incidental ingestion of surface water and surface sediment. Exposure of terrestrial wildlife to chemicals in surface water and surface sediment via dermal contact is unlikely to represent a major exposure pathway because fur and feathers are expected to minimize transfer of chemicals across dermal tissue. Therefore, the dermal pathway for ecological receptors was not evaluated in the SERA.

Several chemicals detected in surface water and/or surface sediment were initially retained as ecological COPCs because their chemical concentrations exceeded screening levels or because they were bioaccumulative chemicals with **ecological effects quotients** (EEQs) greater than 1.0 based on conservative exposure scenarios. These chemicals were then re-evaluated to determine which chemicals had the greatest potential for causing risks to ecological receptors and to determine which COPCs should be retained for further discussion/evaluation. The two primary ecological receptors evaluated were aquatic organisms (i.e., fish and invertebrates) and mammals and birds that consume invertebrates and/or fish. However, none of the initially selected COPCs for surface sediment or surface water were retained as COPCs for aquatic biota, and none of the initially selected COPCs for piscivorous mammals or birds were retained as COPCs for further evaluation. Based on the **results of the SERA**, the overall risk to ecological receptors from site contaminants was determined to be negligible. The Navy, in consultation with Illinois EPA, determined that no further ecological evaluation was warranted. Therefore, ecological risks were not considered for the site in the FFS, and an ecological risk assessment (ERA) was not conducted.

2.5.3 Basis for Action

Landfill wastes and contaminants are to remain buried at the sites. Additionally, relatively small but unacceptable human health risks were identified under current and future land use scenarios from exposure to lead and dioxins/furans in subsurface soil; arsenic, iron, manganese, and vanadium in groundwater; PAHs and dioxins/furans in surface water; and PAHs in sediment. Because risks were identified at both sites and because landfill wastes will remain at Site 1, a response action is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances, pollutants, or contaminants into the environment. The action is also necessary to comply with ARARs that include landfill closure requirements. Additionally, if no action were to be taken at Sites 1 and 4, it is likely that the condition of the storm sewers will continue to degrade, resulting in a continual release of low-level contaminants to Skokie Drain or a potential sudden high-volume release of waste and waste-related contaminants.

2.6 PRINCIPAL THREAT WASTES

The NCP at 40 Code of Federal Regulations (CFR) 300.430(a)(1)(iii)(A) establishes an expectation that treatment will be used to address the principal threats posed by a site wherever practicable. Principal threat wastes are hazardous or highly toxic source materials that result in ongoing contamination to surrounding media which generally cannot be reliably contained, or present a significant risk to human health or the environment should exposure occur. A source material is a material that includes or

contains hazardous substances, pollutants, or, contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or air; or acts as a source for direct exposure.

Although source materials (landfill wastes at Site 1 and residual soil contamination at Site 4) remain in place at the sites, these materials have been covered and have remained relatively undisturbed and stable for several decades. It was determined that source materials did not present a significant risk to human health or the environment. Therefore, principal threat wastes are not present at Sites 1 and 4.

2.7 REMEDIAL ACTION OBJECTIVES

RAOs are medium-specific goals that define the objective of conducting remedial actions to protect human health and the environment. RAOs generally specify the COCs, potential exposure routes and receptors, and acceptable concentrations (i.e., cleanup goals) for a site, and provide a general description of what the cleanup will accomplish. Because USEPA's presumptive remedy guidance was used as the basis for selecting containment as the remedy and because wastes and impacted subsurface soil are to be left in place under the presumptive remedy scenario, no specific cleanup levels were established. The following RAOs were developed for the sites to address protection of human health and the environment:

RAO 1: Prevent direct contact with landfill contents, therefore eliminating unacceptable human exposure to subsurface soil and landfill contents.

RAO 2: Prevent residential exposure to and consumption of shallow groundwater.

RAO 3: Comply with federal and state ARARs and to be considered (TBC) guidance criteria.

RAO 4: Comply with Illinois EPA landfill closure requirements.

RAO 5: Prevent direct exposure routes for human and ecological recipients for the COCs in surface water and sediments.

RAO 6: Minimize subsurface infiltration and resulting contaminant leaching of PAHs and dioxins/furans to groundwater and surface water.

2.8 DESCRIPTION AND COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES

USEPA has developed a response action or **presumptive remedy** for CERCLA municipal landfills that is also to appropriate for military landfills of a similar nature. Site 1 has the characteristics of such landfills. The presumptive remedy guidance establishes some response actions that are typically employed at landfill sites including methods to prevent direct contact with contents and impacted materials, methods to reduce infiltration and resulting leachate generation, and methods to control surface water runoff and erosion. Although Site 4 is not a landfill, the nature of the residual contamination there, as addressed in the **Site 4 RI**, and its location in the middle of Site 1 lends itself to the use of a similar remedy. The presumptive remedy guidance allows the Navy to focus the actions under consideration to only those that are most reasonable for the site and the No Action Alternative, which always must be considered.

Carcinogenic risks associated with current and potential future use scenarios were found to be within USEPA's risk range. For non-carcinogenic risks, the HI only exceeded 1 when direct contact with subsurface materials or long-term groundwater use was assumed. While the baseline risk assessment provided a framework for understanding site risks, it was not able to quantify the primary risk at the site, which is associated with the deteriorating condition of the storm sewer lines that run through the landfill waste. Contaminant concentrations in sediment and surface water are currently relatively low; however, it is reasonable to assume that, if the condition of the storm sewers is not addressed, unacceptable releases would result. Therefore, potential future risks to sediment and surface water would be addressed through the action alternative, which includes the replacement of the damaged Skokie Ditch piping. By abandoning the existing storm sewer lines by grouting them closed, and constructing new storm sewer lines outside of the Site 1 landfill, the entry of landfill leachate, and potentially waste itself,

into the storm sewer pipes will be eliminated. The replacement of the storm sewers will ultimately improve surface water and downstream sediment quality. Additionally, the grouting of the damaged pipes would also reduce the infiltration of water into the waste mass, which should reduce the generation of potentially impacted groundwater. The No Action alternative would take no action to prevent the future release of waste and waste-related contamination associated with the eventual failure of the storm sewer pipes that are within the waste mass.

Although the risks associated with exposure to impacted sediment is within the target risk range, the highest concentrations of PAHs in sediment were just north of Buckley Road. It is unknown whether the contamination at this location is related to releases from the landfill or from construction and road maintenance activities on the adjacent road. At the request of Illinois EPA, the action alternative includes the placement of a riprap layer at this location to discourage both the scouring of the sediment and human excavation into the subsurface. A riprap check dam that will be used for sediment control during construction would be leveled out after construction is complete to provide this supplemental level of risk reduction.

The baseline risk assessment assumed the future use of groundwater. Although that exposure pathway is unlikely given the current Naval Station Great Lakes Instruction 11130.1 which prohibits use of groundwater, there would be no controls on the property should the property be transferred to private ownership. The No Action alternative would not restrict groundwater beyond the controls already in place under Instruction 11130.1. The action alternative would place supplemental administrative controls on the property through the Land Use Controls Tracker database in order to prohibit the use of the shallow aquifer. Land use controls in the LUC Tracker system would be transferred to the property deed should the federal government sell or otherwise relinquish ownership of the property. Additionally, pursuant to enactment of the Illinois EPA's Uniform Environment Covenants Act, 765 ILCS 122, LUC responsibility will be documented in an Environmental Covenant that will be incorporated into the pertinent contractual and property documentation, such as a purchase agreement, deed, or lease. Compliance with 765 ILCS 122 will be to the extent practicable upon the U.S. Government's sale or transfer of the property to a non-Federal entity and will be based on the requirements of 765 ILCS 122 as of the date of the signature of this Record of Decision.

Although shallow groundwater in the immediate vicinity of Sites 1 and 4 has been impacted by historical activities and filling on the properties, contaminant concentrations are relatively low and the shallow aquifer is limited in its extent. Therefore, neither active nor passive groundwater remediation was considered warranted. The No Action alternative would include no monitoring of contaminant concentrations in groundwater. The action alternative would include groundwater monitoring as necessary to satisfy monitoring requirements under Illinois Administrative Code Title 35 Part 811. 318-320. While the rerouting of the storm sewer to the exterior of the fill area will reduce infiltration into the waste mass, the action alternative is not expected to result in any significant changes to groundwater quality, and any monitoring conducted under Part 811.318-320 would be solely to assess the general condition of groundwater and provide a means for identifying any adverse impacts to the groundwater in the vicinity of Sites 1 and 4.

The purpose of a landfill is to contain wastes. The No Action alternative would place no restrictions on excavations through the cover and into the waste mass. The action alternative would establish administrative controls to restrict excavation into the waste, place limits and controls on shallow excavations, and institute periodic inspections of the property to verify the integrity of the cover.

The Sites 1 and 4 property is anticipated to remain a golf course for the foreseeable future. However, as the North Chicago area develops, other uses may eventually be considered. Since contamination within the waste mass will extend beyond the short term, the action alternative would include the establishment of a LUC that restricts future residential development of the property. The No Action alternative would not restrict future residential development.

The general response actions to be used at Sites 1 and 4, as presented in Table 2-4, are consistent with those presented in the guidance and address the pathways identified in the CSM.

TABLE 2-4. GENERAL RESPONSE ACTIONS		
GENERAL RESPONSE ACTION	TECHNOLOGY	PROCESS OPTIONS
No Action	None	Not applicable.
Institutional Controls	Land Use Controls	Legal restrictions on water use, land use and site excavations.
Monitoring	Monitoring	Inspections of cover integrity. Groundwater monitoring to satisfy Part 811.3 18-320 Discretionary sediment and surface water sampling.
Containment	Capping	Maintenance of existing soil cover.
	Surface Water Controls	Replacement of the Skokie Ditch storm sewer infrastructure, with the abandonment of the existing lines by grouting them closed.
	Erosion Control	Riprap layer of Skokie Ditch sediment just north of Buckley Road.

The use of the presumptive remedy approach to both sites allows impacted media and buried landfill materials to remain in place beneath an existing soil cover and eliminates the requirement to conduct an initial identification and screening of alternative technologies other than source containment. Subsequently, the comparative analysis of remedial alternatives for the sites performed in the FFS was limited to two options; source containment under the presumptive remedy, and; consistent with the NCP, the **no action** alternative was evaluated for baseline comparison only.

2.8.1 Description of Remedial Alternatives

Table 2-5 describes the major components of the alternatives evaluated and provides associated costs.

TABLE 2-5. SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED			
ALTERNATIVE	COMPONENTS	DETAILS	COST
No Action No action to address necessary maintenance of existing cover, exposure to buried landfill waste, risks from potential consumption of shallow groundwater, and the potential for future releases of waste and waste-related contaminants through failure of the storm sewer system.	None	No action	No cost

<p>Containment, LUCs, and Monitoring</p> <p>Includes maintenance of existing cover, LUCs to residential exposures, and the potential for future releases of waste and waste-related contaminants through failure of the storm sewer system.</p>	Containment	Maintenance and utilization of existing soil cover to prevent direct contact with buried landfill waste materials.. Improved surface water quality through the abandonment of the storm sewer pipes that run through the waste by grouting them closed, with the construction of new storm sewer lines at the landfill perimeter. Localized containment of Skokie Ditch sediment through placement of a riprap layer at an area of elevated PAHs.	<p>Capital: \$1,612,000 30-Year NPW of O&M Cost: \$621,000 30-Year NPW: \$2,233,000 <u>Discount rate:</u> 7% <u>Time frame:</u> Some restrictions are already in place. Improvements to the Skokie Ditch pipe and channel may take up to 1 year.</p>
	Property use restrictions	Implementation of LUCs to prohibit shallow groundwater usage, restrict future site uses to non-residential activities, and to control subsurface soil disturbances.	
	Monitoring	<p>Routine inspection of site cover to ensure integrity of containment. Such inspections may be performed by golf course facilities maintenance personnel. Sediment and surface water sampling would be at the discretion of the Navy, in consultation with IEPA.</p> <p>Groundwater monitoring would be limited to any remaining monitoring required under Part 811.318-320.</p>	

2.8.2 Comparative Analysis of Remedial Alternatives

Because the only alternative considered other than the Selected Remedy was the No Action alternative, which does not meet the **threshold criteria** for selection, a comparative analysis of alternatives is not appropriate. Section 2.9.4 discusses the statutory determinations and how the Selected Remedy meets the **nine CERCLA evaluation criteria**.

2.9 SELECTED REMEDY

2.9.1 Rationale for Selected Remedy

The Selected Remedy for Sites 1 and 4 consists of the maintenance of the existing landfill cover, the abandonment of the storm sewer lines that run through the landfill by grouting them closed, construction of new storm sewer lines, LUCs to limit future land uses, and inspections of the landfill cover.. The Selected Remedy utilizes elements of the presumptive remedy for CERCLA military landfills with municipal landfill waste. This alternative was selected based on consideration of the requirements of CERCLA, the NCP, application of the presumptive remedy guidance, and input received from Illinois EPA. The remedy will meet the RAOs through: (1) containment of landfill waste; (2) limiting contact with waste and impacted soil; (3) reducing future releases to sediment and surface water through the storm sewer replacement; and (4) by implementing LUCs to restrict groundwater use and subsurface excavations, and to limit future site uses to non-residential activities.

The **principal factors** in selection of this remedy included the following:

- The remedy can be implemented in a relatively short time frame, will be protective of human health and the environment, is cost-effective, and will result in a permanent solution to the maximum extent practicable.
- The remedy is consistent with the current and reasonably anticipated future recreational use of the site.

- The remedy will reduce risk by continuing restrictions on groundwater use, property development, and intrusive activities. Most importantly, the abandonment of the existing storm sewers by grouting them closed and their replacement with new lines at the exterior of the landfill will decrease the movement of contaminants to sediment and surface water and address concerns about future increases in contaminant releases.
- The remedy will close the landfill in accordance with Illinois' landfill closure regulations.

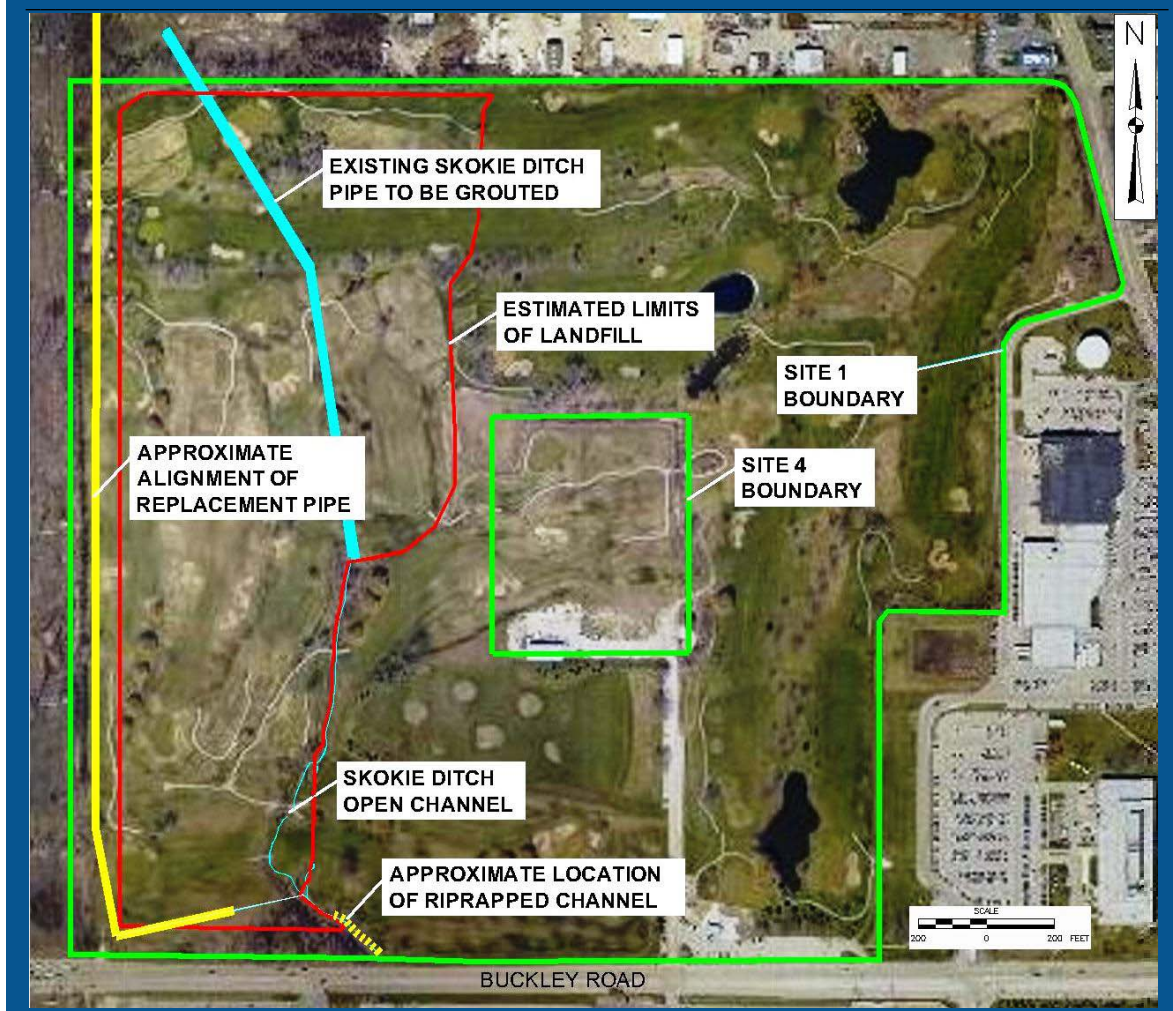
2.9.2 Description of Selected Remedy

The remedy selected for this site consists of three major components: (1) containment; (2) institutional controls; and (3) monitoring.

Containment, in accordance with the presumptive remedy for military landfills with municipal wastes, will be provided by a landfill cap. The cap consists of the existing golf course cover materials. The existing cover, which was encountered in test borings at the Site and which averaged 6.5 feet thick, is considered equivalent to a final landfill cover system as defined by Title 35 Illinois Administrative Code Part 807. That regulation requires at least 3 feet of low permeability soil fill over landfill waste or impacted soil. The existing cover also has a vegetative layer on top of it that, along with the underlying soil material, will be regularly maintained as part of the on-going course management practices. The presence of a vegetative cover and these maintenance practices are to prevent erosion and scour of the cover itself and therefore direct contact with impacted soil and wastes. They are to ensure the cap remains protective of human health and the environment. An O&M Plan which specifically discusses issues relative to the maintenance of cover at the sites will be developed as part of post-ROD documentation and utilized as part of course maintenance activities.

Containment will also be accomplished through the abandonment and replacement of the damaged Skokie Ditch piping. The relocation of the storm sewer to the perimeter of the landfill will remedy the current condition in which groundwater and leachate within the landfill can leak into the pipe and discharge directly to surface water. To address a localized area of PAH contamination in sediment, a riprap layer will be placed over the sediment in the Skokie Ditch just north of Buckley Road to reduce the scour of PAHs in deep sediment and to discourage excavation. Approximate locations of the Skokie replacement piping and riprap layer are shown on Figure 2-7. Final locations will be submitted as part of final design documents.

FIGURE 2-7. PIPE AND RIPRAP LOCATIONS



LUCs will be incorporated into the Base Master Plan to ensure that the restrictions on land used, groundwater use, and excavations that are established in the LUC Memorandum of Agreement (MOA) are applied and enforced at the sites. LUCs will be implemented and maintained by the Navy in perpetuity or until concentrations of hazardous substances in soil, groundwater, and sediment are at levels that allow for unrestricted use and unlimited exposure. LUCs will be implemented within the boundaries of Sites 1 and 4 to limit use of the property and to control access to the remaining contaminated media. Consistent with the RAOs developed for the site, the specific performance objectives for the LUCs to be implemented are as follows:

- To prohibit residential reuse of the site unless prior written approval is obtained from the Navy and Illinois EPA. Prohibited residential uses shall include, but are not limited to, any form of housing, child-care facilities, pre-schools, elementary schools, secondary schools, playgrounds, convalescent, or nursing care facilities.
- To prohibit excavation, drilling, or disturbance of surface and subsurface soil within the limits of Sites 1 and 4 site without an appropriate excavation plan and including safety precautions.
- To maintain the integrity of any existing or future monitoring or remediation system(s) unless prior written approval is obtained from the Navy and Illinois EPA.

- To provide post-closure care and maintain the integrity of the vegetation and cover material over the sites.

The following generally describes those LUCs that will be implemented at the sites to achieve the aforementioned LUC performance objectives:

- Preparation of a site plat describing the above-mentioned LUCs within the boundaries of the sites and filing of the plat with Naval Facilities Engineer Command (NAVFAC) Mid-West's real estate division.
- Incorporation of these restrictions, in the form of a deed notice or lease notice, into any real estate property documents associated with future sale or lease of the site. The real estate property documents will also include a discussion of the status of the site and a description of the COCs in site media.
- Notification of Illinois EPA at least 6 months prior to any transfer, sale, or lease of any property subject to LUCs required by a decision document. This will enable Illinois EPA to be involved in discussions to make sure that appropriate provisions, such as the Illinois EPA's Uniform Environmental Covenants Act 765 ILCS 122 (an environmental covenant), are included in the conveyance documents to maintain effective LUCs.
- Annual inspections to ensure that there are no violations of these restrictions. The Installation Commander will provide annual certification to USEPA and Illinois EPA that there have been no violations of these restrictions.
- If a violation of a restriction occurs, a description of the violation and the corrective actions to be taken to restore protectiveness will be reported immediately to Illinois EPA and USEPA.

LUCs will be implemented and maintained by the Navy in perpetuity until concentrations of hazardous substances in site media are at levels that allow for unrestricted use and unlimited exposure. The Navy or any subsequent owners shall not modify, delete, or terminate any LUC without Illinois EPA concurrence. The Navy is responsible for implementing, maintaining, reporting on, and enforcing the LUCs described in this ROD. Although the Navy may later transfer these procedural responsibilities to another party by contract, property transfer agreement, or through other means, the Navy shall retain ultimate responsibility for the remedy integrity. Should any LUC remedy fail, the Navy will ensure that appropriate actions are taken to re-establish the remedy's protectiveness and may initiate legal action to either compel action by a third party(ies) and/or to recover the Navy's costs for remediating any discovered LUC violation(s). The Navy will maintain, monitor, and enforce the LUCs according to the LUC MOA. LUCs have been developed in accordance with the [Principles and Procedures for Specifying, Monitoring, and Enforcement of Land Use Controls and Other Post-ROD Actions](#), per letter dated October 2, 2003, from Raymond F. DuBois, Deputy Under Secretary of Defense (Installations and Environment), to Hon. Marianne Lamont Horinko, Acting Administrator, EPA. Implementation of this remedy will therefore require a survey of the site, annual visual inspections, and a five-year review with report preparation.

As previously noted, the selected remedy includes routine inspection of landfill containment structures and LUCs and groundwater monitoring as required to fulfill Illinois EPA landfill closure requirements. Routine inspections of the golf course landfill cover system will identify any required maintenance items. LUCs will be routinely evaluated to ensure that they are effective and appropriate. Groundwater monitoring will be as required to satisfy Illinois EPA landfill closure requirements. The Navy may elect to conduct additional monitoring to assess the condition of the Sites in advance of Five-Year Reviews.

The sequence of actions for implementing the Selected Remedy is:

1. Design Skokie Ditch modifications including; new pipe relocation, old pipe grouting, and ditch riprap layer placement.

2. Institute LUCs and input sites into the LUC Tracker System.
3. Install Skokie Ditch modifications.
4. Prepare O&M procedures and institute.
5. Prepare a Quality Assurance Plan and Sample Analysis Plan for groundwater monitoring of the sites in accordance with Title 35 Illinois Administrative Code Part 811.318-320.
6. Perform groundwater monitoring in accordance with the plans.
7. Perform annual inspection and certification of the sites.
8. Perform Five-Year Reviews.

2.9.3 Expected Outcomes of Selected Remedy

The current recreational land use, as a golf course, is expected to remain the same for the foreseeable future. Groundwater at the site is not used and is not expected to be used in the future, and the Selected Remedy will have no impact on current or future groundwater uses available at the site. There are no socio-economic, community revitalization, or economic impacts or benefits associated with implementation of the Selected Remedy. It is estimated that the RAOs for Sites 1 and 4 will be achieved within approximately 1 year of implementation of the remedy. Table 2-6 describes how the Selected Remedy mitigates risks and achieves RAOs for Sites 1 and 4.

Because the current use of the site as a golf course is expected to continue, it is not expected that modification or removal of the LUCs will be required. However, if proposed land use changes in the future and uses other than a golf course are expected, other remedial approaches may be required. Any modifications to LUCs will be conducted in accordance with provisions in the Base's LUC MOA.

TABLE 2-6. HOW SELECTED REMEDY MITIGATES RISKS AND ACHIEVES RAOs

RAO	COMMENTS
Prevent direct contact with landfill contents and impacted subsurface soil	The soil cover will prevent direct contact with landfill contents and COCs in subsurface soil. LUCs will place restrictions on excavations/disturbance of surface and subsurface soil.
Prevent exposure to and consumption of groundwater	LUCs will prevent exposure to groundwater via ingestion, dermal contact, and inhalation that could result in unacceptable risk.
Comply with federal and state ARARs	Use of the soil cover, pipe relocation, and riprap layer will restrict exposure to COCs and allow the Selected Remedy to comply with federal and state chemical-, location-, and action-specific ARARs as listed in the Appendix of the document. TBCs will be met to the extent practicable.
Comply with Illinois EPA landfill closure requirements	The soil cover along with maintenance and monitoring will enable the Selected Remedy to meet landfill closure requirements outlined in Illinois Administrative Code Title 35 Parts 807.305(c), 807.502(a) and (b), 811.110(g), 811.111(c), 811.111(d), 811.314(b)(3)(ii), 811.314(c)(1) and (3), 811.318, 811.319, 811.320, 811.324. Available information regarding the existing cover material and its extent has been reviewed by Illinois EPA and has been found to be sufficient to meet these requirements.
Prevent direct exposure to COCs in surface water and sediment	The abandonment of existing storm sewer lines through the waste mass by grouting them closed will improve surface water and sediment quality. The localized placement of riprap north of Buckley Road will contain and restrict access to a location with elevated PAHs in sediment.
Minimize subsurface infiltration and resulting leaching of COC to groundwater and surface water	Relocation and reconstruction of old piping will reduce infiltration and resulting leaching of COCs to groundwater and surface water. Regular cover maintenance will improve runoff and evapotranspiration of vegetative cover.

2.9.4 Statutory Determinations

In accordance with the NCP, the Selected Remedy meets the following statutory determinations:

- **Protection of Human Health and the Environment** - Containment, LUCs, and monitoring would be protective of human health and the environment. Containment would protect human health by preventing exposure to contaminated subsurface soil and landfill contents and sediment. Institutional controls would prevent future residential development of the site, eliminate exposure to site groundwater and restrict excavation/disturbance of surface and subsurface soil. Monitoring will ensure that the remedy is protective of human health and the environment by verifying that the landfill cover is in place and COCs are not migrating from the capped areas.
- **Compliance with ARARs** - ARARs include any federal or state standards, requirements, criteria, or limitations determined to be legally applicable or relevant and appropriate to the site or remedial action. Containment, LUCs, and landfill cover inspections would meet all **chemical-, location-, and action-specific ARARs**. Federal and state ARARs are presented in Appendix.
- **Long-Term Effectiveness and Permanence**. Although no treatment would be used in the containment, the abandonment of the existing storm sewer lines by grouting them closed will remove the pathway for release of landfill wastes and waste-related contaminants to the Skokie Ditch.
- **Reduction in Toxicity, Mobility, or Volume Through Treatment**. Containment, LUCs, and monitoring would not utilize treatment to reduce the toxicity, mobility, or volume of hazardous substances. However, by reducing the amount of water entering the landfill (via the damaged storm sewer line), the selected action would reduce the mobility of COCs by reducing surface water infiltration.
- **Short-Term Effectiveness**. Containment, LUCs, and monitoring would be effective in the short-term, and implementation of this alternative would not adversely impact the surrounding community or the environment. Because it would help minimize or restrict exposure, it is expected this alternative would achieve the RAOs upon abandonment and replacement of the existing storm sewer lines and the implementation of LUCs and a soil cover maintenance plan.
- **Implementability**. Containment, LUCs, and monitoring would be readily implementable as well as continued maintenance of the existing cover, and the implementation of institutional controls. Relocation of the Skokie Ditch piping will require a moderate construction effort. The resources, equipment, and materials required to implement these activities are currently available. The administrative aspects of this alternative would be relatively simple to implement. Future deed restrictions would ensure continued implementation of LUCs in the event there is a change in property ownership, and LUCs would be reviewed annually to ensure proper maintenance and enforcement of administrative controls. The sites would be added to the Naval Station Great Lakes LUC Memorandum of Agreement (MOA) through their LUC Implementation Plan.
- **Cost**. The estimated present-worth cost of containment, LUCs, and monitoring is \$2,233,000.
- **State Acceptance**. State involvement has been solicited throughout the CERCLA process. Illinois EPA concurs with the Selected Remedy.
- **Community Acceptance**. No written questions, comments, or requests for a public meeting were received during the formal public comment period for the **Proposed Plan**.
- **Five-Year Review**. Because the Selected Remedy results in the landfill contents and impacted media remaining on site and does not allow for unlimited use and unrestricted exposure, a statutory review will be conducted within 5 years of the initiation of the remedy and every 5 years thereafter to ensure that the remedy is, or will be, protective of human health and the environment.

2.10 COMMUNITY PARTICIPATION

The Proposed Plan for Sites 1 and 4 (TtNUS, 2008c) was released for public review and comment on August 14, 2009 by the Navy and Illinois EPA. In accordance with Sections 113 and 117 of CERCLA, a

public notice was published on that date informing the public that the Proposed Plan was available for review at the Environmental Department at Naval Station Great Lakes. The public notice was published in the Great Lakes Bulletin and local Pioneer Press newspapers for the north Chicago suburbs including: The Antioch Review, The Barrington, The Courier-Review, The Buffalo Grove, The Countryside, The Deerfield Review, The Grayslake Review, The Gurnee Review, The Highland Park News, The Lake Forester, The Review of Lake Villa/Lindenhurst, The Lake Zurich Courier, The Libertyville Review, The Lincolnshire Review, The Mundelein Review, and The Vernon Hills Review. With the Public Notice, the Navy solicited comments on the proposed plan and provided the opportunity for interested parties to request a public meeting within a 30-day period ending September 14, 2009. No meeting requests or public comments were received.

The Naval Station Great Lakes Information Repository, which contains the Administrative Record for Sites 1 and 4, is available to the public in the Environmental Department at Naval Station Great Lakes, Building 1A, located on 201 Decatur Avenue, Great Lakes, Illinois. Documents and other relevant information including investigation activities, results, and associated remedial decisions relied on in the remedy selection process are included in the Administrative Record. This ROD will become part of the Administrative Record File per NCP §300.825(a)(2). For access to the Administrative Record or additional information about the Installation Restoration (IR) Program at Naval Station Great Lakes, contact: Howard Hickey at (847) 688-2600, Extension 243.

2.11 EXPLANATION OF SIGNIFICANT CHANGES

Since issuance of the Proposed Plan, the Navy has reevaluated sediment, surface water and groundwater data. Because of the relatively low levels of contamination within these media, the Navy assessed the data in light of the discontinuous nature of groundwater, off-site and published background sediment concentrations, and threshold concentrations in surface water. The Navy has determined that it would be prudent to retain sediment and surface water monitoring as only optional elements of the remedy, with the frequency and extent of sediment and surface water monitoring to be at the discretion of the Navy, in consultation with the Illinois EPA. The Navy has also determined that a formal assessment of groundwater natural attenuation is not warranted based on groundwater contaminant levels and the limited extent of the shallow aquifer. Therefore, groundwater monitoring will be only as required by Part 811.318-320.

In addition, the extent of the riprap layer covering sediment has been modified since preparation of the FS and issuance of the Proposed Plan. Based on the review of sediment contaminant concentrations, it was found that sediment just north of Buckley Road contains the highest levels of PAHs. While the carcinogenic and noncarcinogenic risks from exposure to sediment are within acceptable ranges, the localized placement of riprap at this location should reduce sediment scour and deter any excavation into the sediment. The broad placement of riprap across all sediment at the site is not warranted based on sediment contaminant concentrations.

3.0 Responsiveness Summary

The Navy released the Proposed Plan for Sites 1 and 4 for public comment and encouraged public participation in the remedy selection process. There was no request for a public meeting nor were comments or questions received during the public comment period.

LIST OF ACRONYMS AND ABBREVIATIONS

ARAR	Applicable or Relevant and Appropriate Requirement
BaP	benzo(a)pyrene
bgs	Below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Chemical of concern
COPC	Chemical of potential concern
CSF	Cancer Slope Factor
CSM	Conceptual Site Model
CTE	Central Tendency Exposure
EEQ	Ecological Effects Quotient
EPC	Exposure Point Concentration
ERA	Ecological Risk Assessment
ER,N	Environmental Restoration, Navy
FFS	Focused Feasibility Study
FFTU	Fire Fighting Training Unit
HHRA	Human health risk assessment
HI	Hazard Index
HQ	Hazard Quotient
IAS	Initial Assessment Study
IEUBK	Integrated Exposure Uptake Biokinetic
Illinois EPA	Illinois Environmental Protection Agency
ILCR	Incremental Lifetime Cancer Risk
LUC	Land Use Control
MCL	Maximum Contaminant Level
mg/kg	Milligram(s) per kilogram
MOA	Memorandum of Agreement
NAVFAC	Naval Facilities Engineer Command
NCP	National Oil and Hazardous Substance Pollution Contingency Plan (also called the National Contingency Plan)
NPW	Net present worth
O&M	Operation and maintenance
OSHA	Occupational Safety and Health Act
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PPE	Personal Protective Equipment
PRG	Preliminary Remediation Goal
RAO	Remedial Action Objective
RfD	Reference Dose
RI	Remedial Investigation
RI/RA	Remedial Investigation/Risk Assessment
RME	Reasonable Maximum Exposure
ROD	Record of Decision
SERA	Screening-Level ERA
SARA	Superfund Amendments and Reauthorization Act
SSL	Soil Screening Limit
TACO	Tiered Approach to Corrective Action Objectives
TAL	Target Analyte List
TCL	Target Compounds List
ug/l	Microgram(s) per liter
U.S.	United States
USEPA	United States Environmental Protection Agency
VOC	Volatile organic compound



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DETAILED ADMINISTRATIVE RECORD REFERENCE TABLE

ITEM	REFERENCE PHRASE IN ROD	LOCATION IN ROD	LOCATION OF INFORMATION IN ADMINISTRATIVE RECORD
1	Initial Assessment Study	Section 1.0	Rogers, Golden & Halpern, 1986. Initial Assessment Study, Naval Complex Great Lakes, Illinois. Environmental Restoration Department, Naval Energy and Environmental Support Activity, Port Hueneme, California.
2	Technical Memorandum on the remedial Investigation (RI) Verification Step	Section 1.0	Dames & Moore, A Professional Limited Partnership, 1991. Technical Memorandum on the Remedial Investigation Verification Step for the Naval Training Center Great Lakes, Illinois. Naval Energy and Environmental Support Activity Environmental Protection Department, Port Hueneme, California.
3	Remedial Investigation Report, FFTU	Section 1.0	Beling Consultants, 1998. Remedial Investigation Report, Fire Fighting Training Unit, Naval Training Center Great Lakes, Illinois. Illinois Environmental Protection Agency Bureau of Land.
4	Delivery Order Completion Report, Remedial Investigation of Soils, Former FFTU Sludge Pit	Section 1.0	TolTest, Inc., 2000. Delivery Order Completion Report, Remedial Investigation of Soil at Former FFTU Sludge pit, Naval Training Center Great Lakes, Illinois. Department of the Navy, Naval Training Center- Environmental Department.
5	RI/Risk Assessment	Section 1.0	TtNUS, 2008. Remedial Investigation and Risk assessment report, Site 1-Golf course Landfill, Naval Station Great Lakes, Great Lakes, Illinois. Naval Facilities Engineering Command.
6	Focused Feasibility Study	Section 1.0	TtNUS, 2009. Focused Feasibility Study, Site 1-Golf Course Landfill and Site 4- Fire Fighting Training Unit, Naval Station Great Lakes, Great Lakes, Illinois. Naval Facilities Engineering Command Midwest.
7	presumptive remedy	Section 1.1	United States Environmental Protection Agency, 1996. Application of the CERCLA Municipal Landfill Presumptive Remedy to Military Landfills.

DETAILED ADMINISTRATIVE RECORD REFERENCE TABLE

ITEM	REFERENCE PHRASE IN ROD	LOCATION IN ROD	LOCATION OF INFORMATION IN ADMINISTRATIVE RECORD
8	http://www.epa.gov/fedfac/documents/1296mem.htm	Section 1.1	United States Environmental Protection Agency, 1996.
9	Golf Course Landfill	Section 2.1	TtNUS, 2008. Section 2.1.2.
10	sinkholes	Section 2.1	TtNUS, 2008. Section 2.3.1.
11	Unburned fuels	Section 2.1	C.H. Guernsey & Company, 2002. Final Environmental Assessment, Willow Glen Golf Course: Reconstruction of the Back-nine Holes, Morale, Welfare & Recreation, Great Lakes Naval Training Center Great Lakes, Illinois. NTC Great Lakes Environmental Department. Section 3.2.3.2.
12	Biopiles	Section 2.1	Beling Consultants, 1998. Trench Activity Report for Demolition and Removal of Piping, Usts, and Subsurface Structures, Naval Training Center, Great Lakes, Illinois. Section 3.8.
13	groundwater and surface water samples	Table 2-1	Dames & Moore, A Professional Limited Partnership, 1991. Table ES-1.
14	Results	Table 2-1	Dames & Moore, A Professional Limited Partnership, 1991. Section 2.2.
15	Results	Table 2-1	Dames & Moore, A Professional Limited Partnership, 1991. Section 2.2.1.2.2.
16	shallow groundwater	Table 2-1	Dames & Moore, A Professional Limited Partnership, 1991. Section 2.2.2.3.1.
17	subsurface soil samples	Table 2-1	Beling Consultants, 1998. Section 2.2.
18	Laboratory Results	Table 2-1	Beling Consultants, 1998. Tables 1 and 2.
19	TACO Tier 2 analysis	Table 2-1	Beling Consultants, 1998. Section 5.0.
20	samples from nine borings	Table 2-1	TolTest, Inc., 2000. Section 4.2.
21	Results	Table 2-1	TolTest, Inc., 2000. Section 5.0.
22	Samples were collected from 16 of the 103 soil borings	Table 2-1	TtNUS, 2008. Section 3.2.1.
23	clayey soil	Section 2.3	TtNUS, 2008. Section 3.3.
24	ash material	Section 2.3	TtNUS, 2008. Section 3.4.
25	shallow groundwater	Section 2.3	TtNUS, 2008. Section 3.5.2.
26	waste materials	Section 2.3	TtNUS, 2008. Section 4.1.
27	contamination in the site media	Section 2.3	TtNUS, 2008. Section 4.2.
28	Site 4 RI recommended	Section 2.3	Beling Consultants, 1998. Section 6.0.
29	not used for drinking water	Section 2.4	Commanding Officer, Naval Station, Great Lakes, 2003. Letter from the Department of the Navy regarding Ground Water Use

DETAILED ADMINISTRATIVE RECORD REFERENCE TABLE

ITEM	REFERENCE PHRASE IN ROD	LOCATION IN ROD	LOCATION OF INFORMATION IN ADMINISTRATIVE RECORD
			Restrictions.
30	exposure assessment	Section 2.5.1	TtNUS, 2008. Section 6.2.
31	toxicity values	Section 2.5.1	TtNUS, 2008. Section 6.3.
32	Quantitative estimates of non-cancer and cancer risks	Section 2.5.1	TtNUS, 2008. Section 6.4.1.
33	exposure to lead	Section 2.5.1	TtNUS, 2008. Section 6.4.4.5.
34	summary	Section 2.5.1	TtNUS, 2008. Section 6.6.
35	Screening-Level Ecological Risk Assessment	Section 2.5.2	TtNUS, 2008. Section 7.1.
36	ecological effects quotients	Section 2.5.2	TtNUS, 2008. Section 7.4.
37	results of the SERA	Section 2.5.2	TtNUS, 2008. Section 7.9.
38	RAOs	Section 2.7	TtNUS, 2009. Section 2.1.1.
39	presumptive remedy	Section 2.8	United States Environmental Protection Agency, 1996.
40	Site 4 RI	Section 2.8	Beling Consultants, 1998.
41	no action	Section 2.8	TtNUS, 2009. Section 3.2.1.
42	Capital: \$1,612,000 30-Year NPW of O&M Cost: \$621,000 30-Year NPW: \$2,233,000	Table 2-5	TtNUS, 2009. Calculation Sheet.
43	threshold criteria	Section 2.8.2	TtNUS, 2009. Section 4.3.1.2.
44	nine CERCLA evaluation criteria	Section 2.8.2	TtNUS, 2009. Section 4.3.2.2.
45	principal factors	Section 2.9.1	TtNUS, 2009. Section 5.1.
46	Principles and Procedures for Specifying, Monitoring, and Enforcement of Land Use Controls and Other Post-ROD Actions	Section 2.9.2	Deputy under Secretary of Defense (Installations and Environment), 2003. Letter Addressing the Environmental Protection Agency.
47	chemical-, location-, and action-specific ARARs	Section 2.9.4	TtNUS, 2009. Table 2-1.
48	Proposed Plan	Section 2.9.4	Department of the Navy, Naval Station Great Lakes, 2009. Proposed Plan for Site 1- Golf Course Landfill and Site 4- Fire Fighting Training Unit, Naval Station Great Lakes, Installation Restoration Program, Great lakes Illinois.
49	public notice	Section 2.10	Pioneer Press Certificate of Publication, 2009. Public notice.

APPENDIX

TABLE

FEDERAL AND STATE ARARS AND TBCS

SITE 1 (GOLF COURSE LANDFILL) AND SITE 4 (FIRE FIGHTING TRAINING UNIT) RECORD OF DECISION

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Chemical-Specific ARARs	Citation/Reference	Type	Rationale for Use at Sites 1 and 4, Naval Station Great Lakes
FEDERAL			
Safe Drinking Water Act Maximum Contaminate Levels (MCLs), MCL Goals, and Secondary MCLs	40 Code of Federal Regulations (CFR) 140- 143	Potentially applicable	Would be used as protective levels for groundwater that is a current or potential future drinking water source. However, groundwater is not currently used as a potable water source and is not expected to be used as a potable water source in the future at Site 1.
Preliminary Remediation Goals	U.S. EPA Region 9, 2004	To Be Considered (TBC)	Benchmark values for assessing the need for soil, groundwater, and air remedial action/corrective measures.
Generic Soil Screening Levels	U.S. EPA, 1996b	TBC	Benchmark values for assessing the need for soil remedial action /corrective measures. The SSLs assess the potential migration of chemicals from soil to air and from soil to groundwater.
Resource Conservation and Recovery Act Subtitle C – Hazardous Waste Identifications and Listing Regulations	40 CFR 261	Potentially applicable	Would be used to identify a material as a hazardous waste and thus determine the applicability and relevance of RCRA C Hazardous Waste Rules.
U.S. EPA Health Advisories	U.S. EPA, 1996a	TBC	Benchmark values for assessing the need for groundwater remedial action/corrective measures.
STATE			
Illinois EPA Tiered Approach to Corrective Action; residential soil remediation objectives	Illinois EPA, 2005	TBC	Benchmark values for assessing the need for soil, groundwater, and air remedial action/corrective measures. The remediation objectives assess ingestion of soil, inhalation of chemicals from soil, migration of chemicals from soil to groundwater, and ingestion of groundwater.

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Location-Specific ARARs	Citation/Reference	Type	Rationale for Use at Sites 1 and 4, Naval Station Great Lakes
FEDERAL			
U.S. EPA's Groundwater Protection Strategy	U.S. EPA, 1984	To Be Considered	Surficial groundwater at Site 1 is likely designated as Class IIIA: Special Resource Groundwater.
Historic Sites, Buildings, and Antiquities Act of 1935	16 U.S. Code (U.S.C.) 461 et seq.	Potentially Applicable	This act would be applicable if information is found to classify Site 1 as a historic or prehistoric property of national significance. No historic sites or buildings are known to exist at Site 1.
Archaeological and Historic Preservation Act of 1974	16 U.S.C. 469 et seq.	Potentially Applicable	This act would be applicable if historic and archaeological artifacts were to be affected by remedial activities. No such artifacts are known to exist within the boundaries of Site 1.
Archaeological Resources Protection Act of 1979	16 U.S.C. 479(aa) et seq.	Potentially Applicable	This act would be applicable if archaeological artifacts were discovered during remedial activities. No such artifacts are known to exist within the boundaries of Site 1.
Conservation Programs on Military Reservations (Sikes Act) of 1960, as Amended	16 U.S.C. 670(a) et seq.	Applicable	This act requires that military installations manage natural resources for multipurpose uses and public access appropriate for those uses consistent with the military department's mission.
Endangered Species Act Regulations	50 Code of Federal Regulations (CFR) Parts 81, 225, 402	Potentially Applicable	If a site investigation or remediation activity could potentially affect an endangered species or their habitat, these regulations would apply. No such species are known to inhabit Site 1.
Fish and Wildlife Coordination Act Regulations	40 CFR Section 6.302 and 33 CFR Subsection 320.3	Potentially Applicable	If the Site 1 remedial alternative involves the alteration of a stream or wetland, these agencies would be consulted. If modifications must be conducted, the regulation requires that adequate protection be provided for fish and wildlife resources.

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Location-Specific ARARs	Citation/Reference	Type	Rationale for Use at Sites 1 and 4, Naval Station Great Lakes
National Environmental Policy Act (NEPA) Regulations: Wetlands, Floodplains, etc.	40 CFR Subsection 6.302 (a)	Potentially Applicable	If the Site 1 remedial alternative adversely affects a wetland, these regulations apply.
NEPA Regulations: Floodplain Management, Executive Order 11988	40 CFR Part 6, Appendix A	Potentially Applicable	If the Site 1 remedial action takes place in a floodplain, alternatives that would reduce the risk of flood loss and restore/preserve the floodplain must be considered.
STATE			
Illinois Wetland Protection Program	Chapter 20 Department of Natural Resources, Act 830	Potentially Applicable	If a remedial action could potentially affect a wetland, this policy would be considered.
Illinois Threatened and Endangered Species Regulations	520 Illinois Compiled Statutes 10/1	Potentially Applicable	This act would be considered in conjunction with the federally listed endangered species act if a site investigation or remediation could potentially affect a state-listed threatened or endangered species.

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Action-Specific ARARs	Citation/Reference	Type	Rationale for Use at Site 1 and 4, Naval Station Great Lakes
FEDERAL			
Solid Waste Disposal Act / Resource Conservation and Recovery Act Subtitle C	42 U.S. Code (U.S.C.) 6905, 6912a, 6924-6925	–	–
<ul style="list-style-type: none"> Standards for Hazardous Waste Generators 	40 Code of Federal Regulations (CFR) 262	Potentially applicable	Applicable for removed site wastes determined to be hazardous.
<ul style="list-style-type: none"> Standards for Hazardous Waste 	40 CFR 263	Potentially applicable	Applicable for site wastes determined hazardous that are transported off site.
<ul style="list-style-type: none"> Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities (TSDFs) 	40 CFR 264	Potentially applicable	These regulations would be applicable to waste removed from the site including both on-site and off-site management.
Interim Status Standards for Owners and Operators of Hazardous Waste TSDFs	40 CFR 265	Relevant and appropriate	Establishes design and operating criteria for hazardous landfills.
RCRA Land Disposal Restrictions Requirements	40 CFR 268	Potentially applicable	If off-site treatment or disposal of contaminated media and/or disposal of treatment residuals that may be considered hazardous waste is necessary, it would be subject to LDRs.
Hazardous and Solid Waste Amendments of 1984	42 U.S.C. 6926	Potentially Applicable	Establishes a corrective actions program requiring four basic elements (assessment, investigation, corrective measures study, implementation).
The Clean Water Act National Pollution Discharge Elimination System	40 CFR 122	Potentially applicable	These requirements are applicable for alternatives that include a surface water discharge.

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FEDERAL AND STATE ARARS AND TBCS SITE 1 (GOLF COURSE LANDFILL) AND SITE 4 (FIRE FIGHTING TRAINING UNIT) RECORD OF DECISION NAVAL STATION GREAT LAKES GREAT LAKES, ILLINOIS PAGE 5 OF 6

Action-Specific ARARs	Citation/Reference	Type	Rationale for Use at Site 1 and 4, Naval Station Great Lakes
Clean Air Act National Ambient Air Quality Standards	42 U.S.C §7401- 7642, 40 CFR Part 50	Potentially applicable	Remedial action/corrective measures involving treatment of media could result in emissions to the atmosphere.
Department of Transportation Hazardous Materials Transportation	49 CFR	Potentially applicable	These rules are considered potentially applicable depending on whether wastes are shipped off site for laboratory analysis, treatment, or disposal.
Occupational Safety and Health Administration Standards	29 CFR 1910.120	Applicable	On-site activities are required to follow OSHA requirements.
National Environmental Policies Act (NEPA)	42 U.S.C 4321 et seq.	Relevant and appropriate	Remedial action/corrective measures could constitute significant activities, thereby making NEPA requirements ARARs; however, activities conducted in accordance with the National Contingency Plan are considered to meet the substantive NEPA requirements.
Soil Conservation Act	U.S.C. 5901 et seq.	Applicable	During remedial activities, implementation of soil conservation practices would be required.
National Emission Standards for Hazardous Air Pollutants	40 CFR 61	Potentially applicable	Remedial activities that generate fugitive dust or incineration would require emission standards for designated hazardous pollutants.
STATE			
Illinois Waste Disposal (Hazardous)	35 Illinois Administrative Code (IAC) 721, 722, 723, 724, and 728	Potentially Applicable	These regulations would apply if waste on-site was deemed hazardous and needed to be stored, transported, or disposed properly.
Illinois Solid Waste and Special Waste Hauling	35 IAC 809	Potentially Applicable	These regulations would apply if waste is transported to a disposal facility.

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Action-Specific ARARs	Citation/Reference	Type	Rationale for Use at Site 1 and 4, Naval Station Great Lakes
Illinois Emission Standards for Hazardous Air Pollutants	35 IAC Subtitle B, Chapter I	Potentially applicable	Remedial activities that generate fugitive dust or incineration would require emission standards for designated hazardous pollutants.
Illinois Environmental Protection Act	415 Illinois Compiled Statute 5/1, Titles II, III, V, and VI	Applicable	These regulations include requirements for air pollution, water pollution, land pollution and refuse disposal, and noise pollution.
Illinois Groundwater Quality Regulations	35 IAC 620	Applicable	These regulations establish groundwater monitoring and reporting requirements as determined under the Permit Section of the Division of Land Pollution Control.
Illinois Landfill Closure Regulations	35 IAC 807.305(c), 807.502(a) and (b), 811.110(g), 811.111(c), 811.111(d), 811.314(b)(3)(ii), 811.314(c)(1) and (3), 811.318, 811.319, 811.320, 811.324	Relevant and appropriate	These regulations establish landfill closure requirements, including monitoring and maintenance requirements.